Chemical Age

ICI's BIG TERYLENE EXPANSION (page 440)

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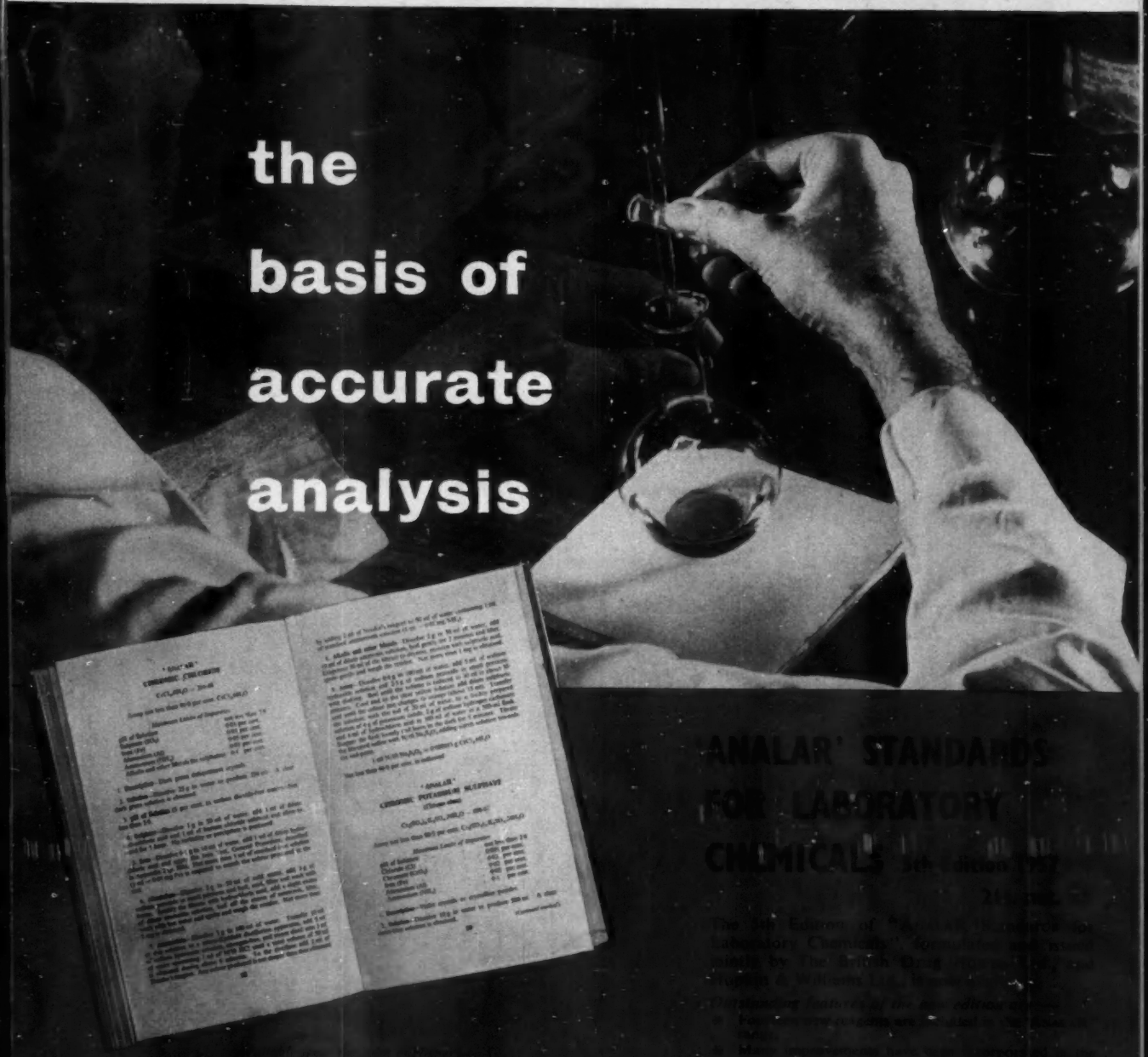

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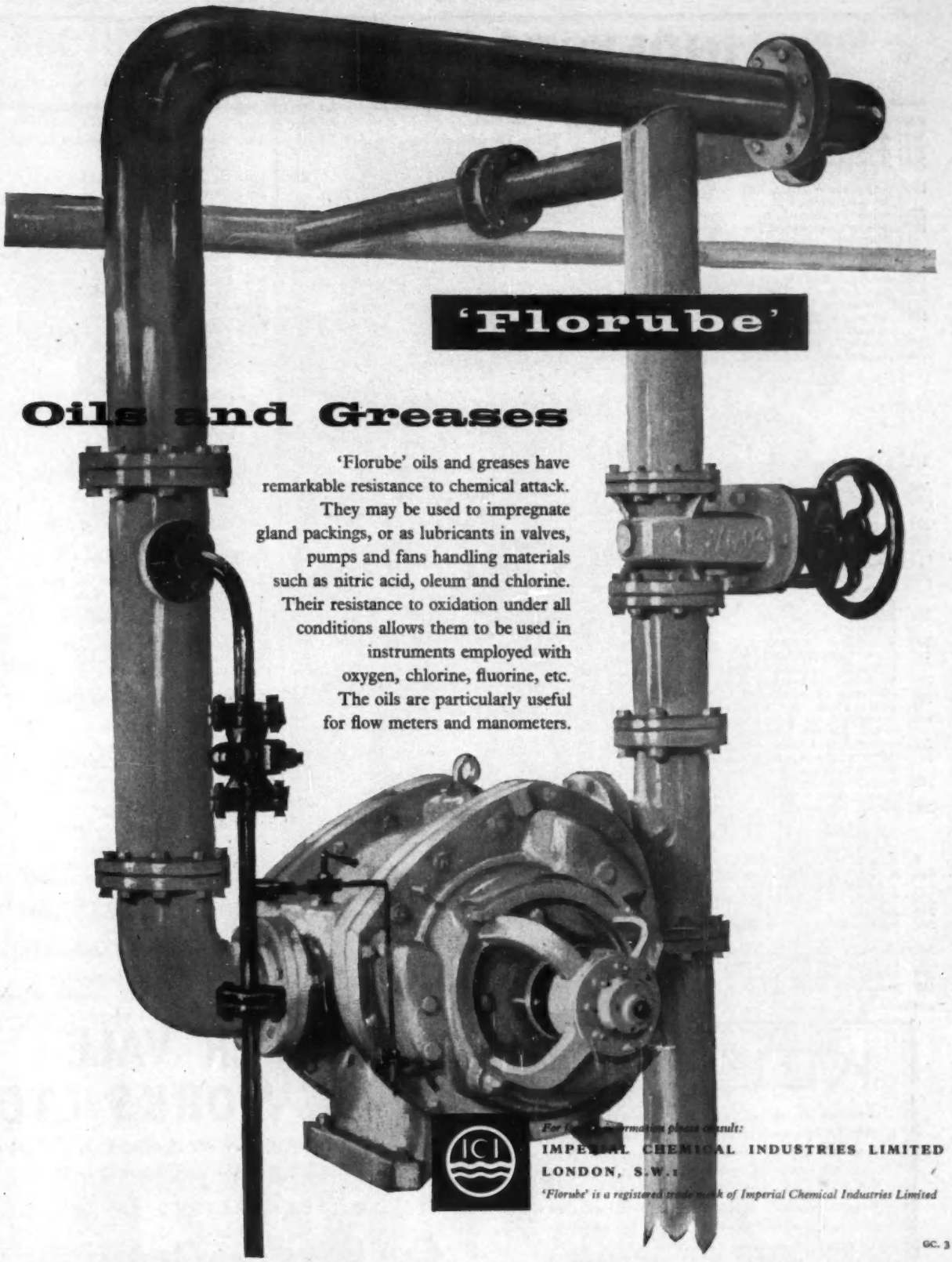

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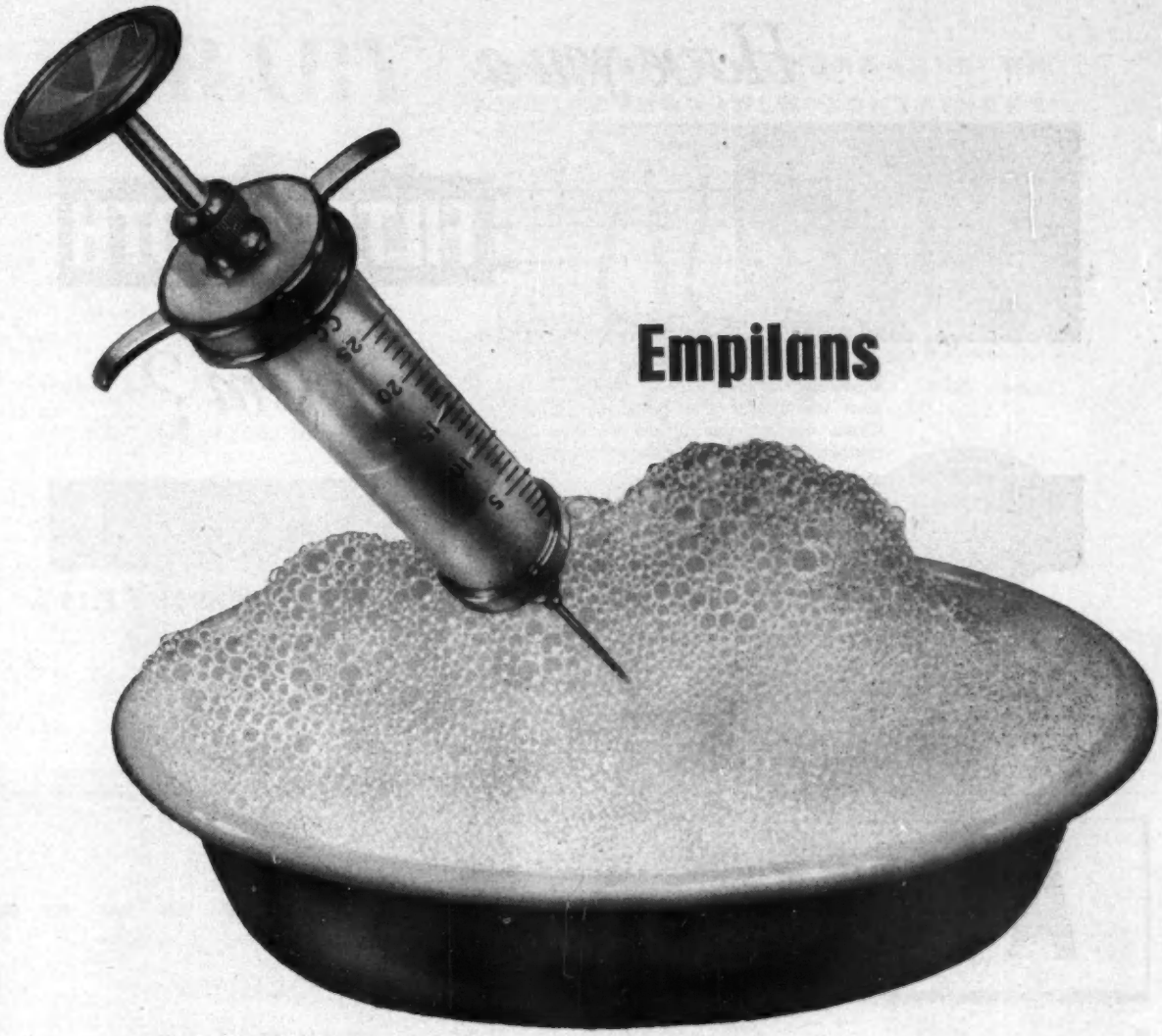

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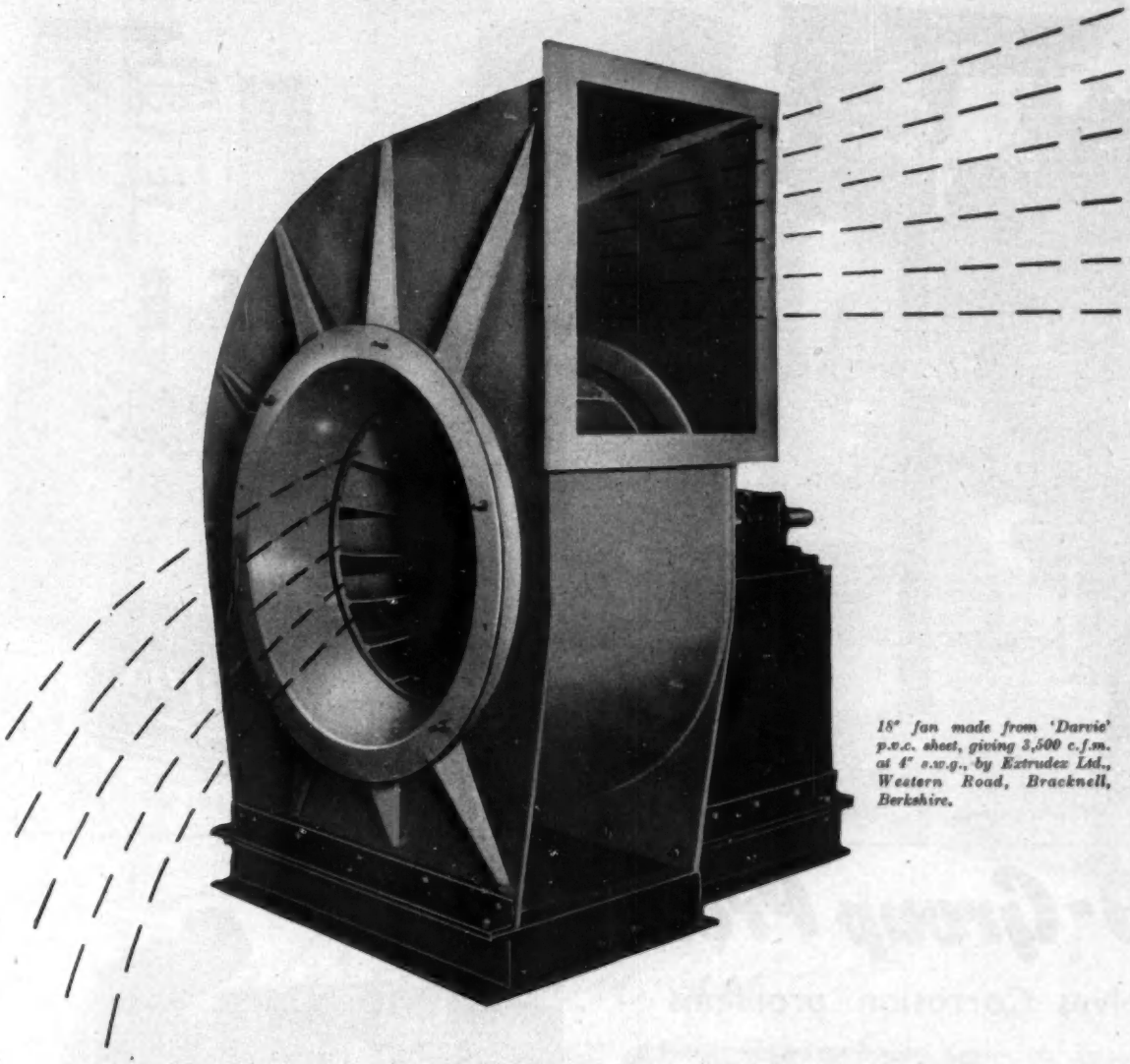

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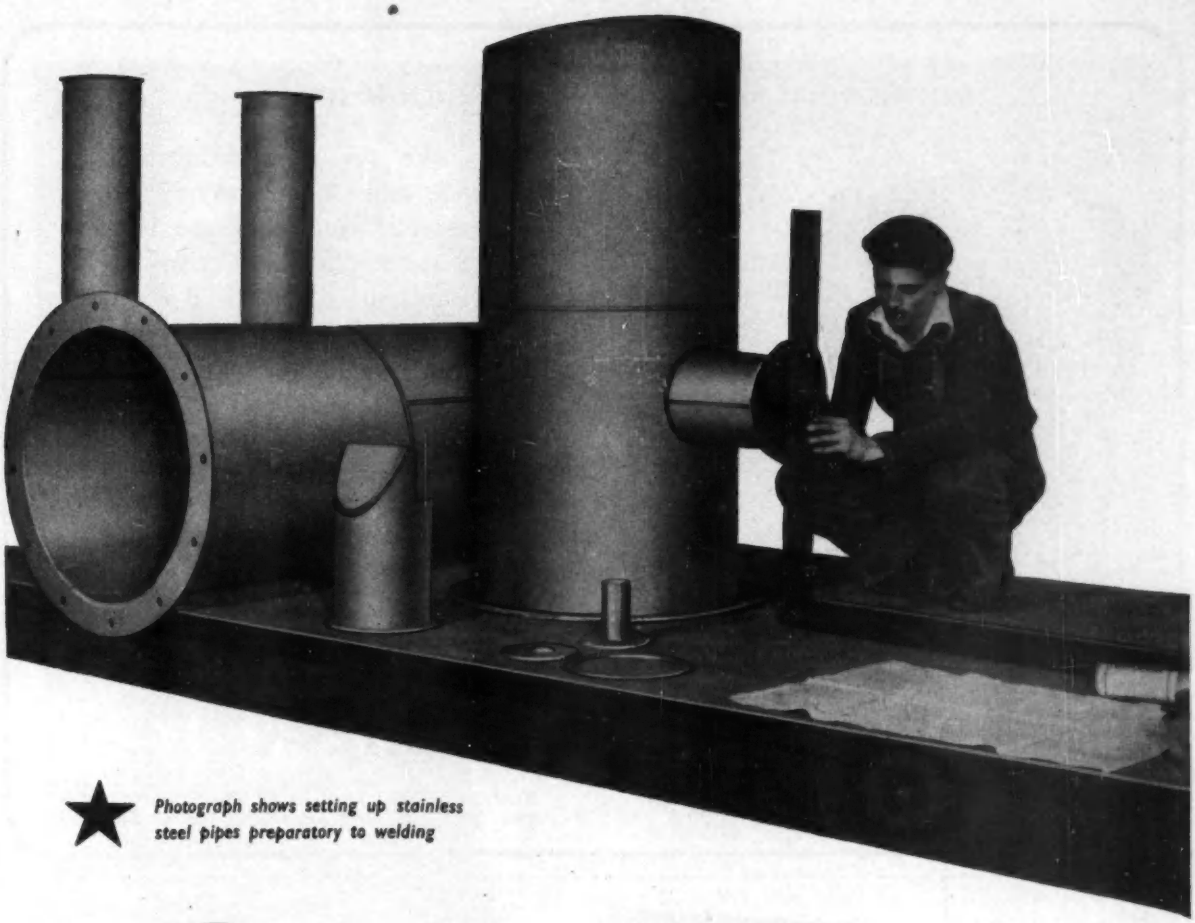

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OUTLOOK FOR RUBBER

CRITICAL examination of the natural rubber industry together with proposals for its future progress is made in the recently published but not widely circulated report of the 'Advisory Committee Enquiring into Production Development and Consumption Research in the Natural Rubber Industry'. Heading the six-man commission was Professor E. G. Blackman of Oxford University.

The natural rubber producing industry of Britain and Malaya, concerned at the continued and growing interest in synthetic rubbers had sought an impartial survey so that the industry might have some basis on which to plan to meet the competition from synthetics.

Much of the Blackman report is devoted to a consideration of how research and development can lead, firstly, to a greater production of rubber in the field and, secondly, to improved methods of processing and manufacture. It is stressed, however, that such measures will be of no avail in meeting the threat of synthetic rubbers unless 'these efforts can be translated into the production of natural rubber at a competitive price'. The Commission are, however, fully aware that assessments as to what is a competitive price are subject to many uncertainties.

With regard to the economic factors, the report pulls no punches, stating that the continuance of such high prices as have been demanded in recent years, 'can only be regarded as wholly inimical to the plantation industry. At these levels it will be commercially attractive to construct full scale plants for the manufacture of the newer synthetic rubbers which are still at present in the development stage.' The Commission also note that the experience gained in operating these plants will lead to the design of better plants in the future and still lower prices.

Fluctuations in natural rubber prices have always been a source of annoyance to the manufacturer, who cannot easily plan future programmes of production. One point which the Commission comments on is that price fluctuations result from undue gambling in 'futures' centred on the Singapore market. There is as yet no legislation in force to restrict this gambling. Another problem appears to be that discrepancies occur between the grade as shipped from Singapore and that received by the importer, due to dishonest packers. Existing methods of packaging and wastages also leave much to be desired.

Blackman and his colleagues reasonably suggest that it would be to the plantation industry's interest, if pressure could be brought to bear to strengthen the hand of the Malayan Rubber Export Registration Board. Also packing difficulties could be overcome, as is rightly suggested, by closer contact between producers and manufacturers in the principal consuming countries.

Further, it is recommended that the industry should have as its future aim the profitable production of good quality natural rubber at not more than 60 and possibly 55 Malayan cents a pound (f.o.b.). This price is based on the price of GR-S synthetic rubber which is considered unlikely to change. Natural rubber of high quality (No. 1 sheet, for example) would be competitive at a price of 70-75 Malayan cents a pound (f.o.b.). Cost of synthetic rubber of the polyisoprene type is likely to be greater than that of GR-S. Less certain, however, is the cost of polymerised butadiene, whilst the cheaper butyl rubber, if its deficiencies can be overcome, is deemed another serious competitor.

A main recommendation of the Commission is that 'if competition (from synthetics) is to be met by natural rubber and if the share of the market is not to dwindle over the years, it is imperative in the first place that the price of natural rubber should be low enough to ensure that it will be preferred to possible alternative materials. Secondly, the supplies reaching the manufacturers should be of a form and quality which best meet their requirements. Thirdly, every endeavour should be made to exploit to the full the properties of natural rubber and fourthly, efforts should be intensified to rectify as far as possible its known shortcomings.'

Problems of carrying out research on plantations, the need for specialised equipment and trained scientists and technicians, are also considered in the Blackman report and some sound advice is offered to the rubber producers. Research should be better co-ordinated and research programmes should have 'commercial exploitation' as their ultimate aim. Too many research projects, states the report, are of no potential marketing value.

For too long have the natural rubber producers clung to the unique property of natural rubber—that of the small amount of heat generated when the material is flexed—which has made it so pre-eminently suitable for tyres. Now, however, US research has discovered cis–1 : 4–polyisoprene, obtained by polymerisation of isoprene. It has been demonstrated that this product can be employed in the manufacture of heavy duty tyres. Another recent development is the polymerisation of butadiene to produce *cis*–1 : 4–butadiene the first synthetic rubber which has an elasticity equal to, if not greater than, that of natural rubber.

At the end of August the U.S. Army announced that all butyl synthetic tyres had passed rigid Army tests. Tyres of polyisoprene which have been under test by Firestone Tyre and Rubber Co., are stated to be equal or better than those made of natural rubber. In fact, there is now every possibility of producing 'tailor-made' synthetic rubbers. Thus, a third factor has entered the natural versus synthetic field—quality and suitability for specific purposes. Another telling point is therefore balanced against natural rubber.

Full awareness of the encroachment of synthetics into natural rubber's field is indicated in the report. In fact, it recommends that many practices used by the US with regard to synthetic rubber could be applied with advantage. From enquiries the Commission made in the US, it appears that for 25 to 33 per cent of rubber in current use synthetics have a technical advantage; for approximately the same proportions natural rubber is essential. For the remainder, the market is truly competitive—that is, the choice of the material is dependent on the relative price.

SYNTHETIC RUBBER PLANTS

At the present time there are some 18 plants producing synthetic rubbers in the US. Three of these plants are due to expand by 25,000 tons, 80,000 tons and 58,000 tons respectively by the end of this year. One new plant is under construction and due to be in operation by next year.

For the United Kingdom, Dunlop Rubber have a semi-commercial GR-S plant in operation at Fort Dunlop. ICI's Wilton GR-S plant is nearing completion, and International Synthetic Rubber and British Geon Ltd., both have plants under construction which are due to be completed next year. In the planning stage is Du Pont's at Londonderry. In addition, there are the Monsanto Tred and ICI Butakon plants.

In West Germany, Chemischewerke Hüls has a 10,000 ton GR-S plant operating while Bunawerke Hüls (Bayer, Hoechst and Badische-Anilin) has a 45,000 ton GR-S plant under construction which should be finished next year. France, Société du Caoutchouc, has a GR-S plant in the planning stage which is expected to be completed in 1960. A butyl unit is due to be completed by mid-1958. Canada has a plant (Polymer Corporation of Canada) in operation; Italy has a plant due to be completed in 1959 and Holland, India, Japan and Spain all have plans for plants.

Reports from the Soviet zone of Germany suggest that by 1960, some 100,000 tons a year of synthetic rubber will be produced. Most of the present output (73,000 tons in 1955) in the German Democratic Republic is being produced at Schkopau, where new units are under construction.

CHANGING SITUATION

Until recently the US has been the only major source for foreign synthetic rubber consumers but as can be seen from the above notes, the situation is changing. Natural rubber will, however, retain its share (62 per cent) of the world rubber market for some time to come as most of the units now under construction will not begin operations for at least a year or more. Facing the natural rubber producers is, of course, the possible time it will take for synthetics to oust it from its present place.

In the US, the changeover has not taken long. Only a few years ago synthetics were produced to supplement the natural product. But demand, natural rubber price fluctuations and insufficient supplies of natural rubber resulted in synthetics output being doubled. In 1955, 58 per cent of the rubber consumed in the US was synthetic; last year it was 61 per cent. This year, it is estimated that 940,000 long tons (63 per cent approximately) will be produced compared with 560,000 tons of natural product and estimates for 1960 put the consumption of synthetics at 1,090,000 tons (65 per cent) compared with 590,000 of natural. If the rest of the world follows the US pattern, natural rubber would fast become the 'supplementary' rubber.

Consideration is not only given to natural rubber versus synthetic rubbers in the Blackman report. Attention is called to the rapid advances being made in the development of plastics materials and that these in turn are being combined with synthetic rubbers. The fact that plastics have in some instances displaced natural rubber is not forgotten and that in the future, competition is likely to be intensified. As these achievements have been accomplished by the chemical industry which is a highly competitive one, it must not be forgotten that there is a pronounced urge to discover new compounds, and having found these to expand sales, and seek new applications for them.

In the synthetic field large sums of money have already been and are being spent. Blackman and his colleagues therefore urge the plantation industry to sponsor a 'reasonable proportion of basic research'. It is certainly most important to the industry to do this for as the fields of research undertaken by the producers of synthetic rubbers overlap with those of natural rubbers, some of the patents will also overlap. 'If basic research on the properties or processing of natural rubber is neglected, technical progress could be hampered or even blocked by patents arising from studies of synthetic rubbers.'

Those who have read this commission's study cannot but appreciate its clarity, and the sound recommendations made. The important questions are—Has the report been asked for too late? Can the natural rubber industry equip itself in a sufficiently short time with technical staff and modern equipment to effectively keep pace with the producers of synthetics?

The natural rubber industry has a heavy task facing it, but the Blackman report should materially assist it in putting its house in order. Moreover, it has some breathing space in which to do this, having regard to the time when the new plants are due to be in operation.

Radiation Energy May Lead to New Chemical Compounds

The Future of Atomic Energy

GLITTERING prospects lie ahead for the UK in the development of nuclear power, fusion reactors and the rapidly increasing use of radioisotopes in industry and research. This was the theme of a forward-looking paper entitled 'The future of atomic energy', presented by Sir John Cockroft on 12 September at the UNESCO conference in Paris on radioisotopes (see also Chemical Age, 14 September, p. 402).

Sir John declared that development of nuclear power would be more rapid in West Europe than in the US, the USSR and most of the rest of the world, where there was an abundant supply of conventional fuels and unexploited hydro-electric capacity.

Dealing with the growing use of radioisotopes, he stated that radiation energy might be used to make chemicals at present produced by high pressure and temperature or might even lead to the introduction of new compounds.

Sir John said that industry was at present trying to find new useful radiation-induced polymerisation products. Vulcanisation of rubber was generally carried out by using sulphur as the link between different atoms. By using radiation that link might be established without introducing a new element and the resulting product had therefore much better temperature resistant properties. So tyres were claimed to last longer.

The use of massive radiation was very new, in fact newer than atomic energy itself. The development was in its infancy, but Sir John believed that the use of radiation might be of great importance and engineers of future atomic power reactors might be well advised to think about the practical aspects of using some of the immense amount of gamma radiation at present unused, which was locked up in those plants.

$500m. Saved Annually

US industry and agriculture were already saving $500 million a year by the use of radioisotopes, at a cost to the Government of about $3 million. That was a remarkable example of the multiplying and catalysing effect of research. However, still greater advantages were predicted in the future and it was predicted that this saving would rise to $5,000 million a year by 1960.

The application of radioisotopes to facilitate oil-well stimulation in the US alone was saving $180 million a year. US scientists also saw a great extension of process control by labelling with carbon 14 important contributions such as octane going into an oil refinery. That would be done with very low levels of activity since the initial C14 content was very nearly zero.

The large scale development of nuclear power presented problems of concentration and storage of the radioactive waste products from the chemical separation plant where fuel elements were processed. In the UK, waste products were evaporated to small volume and stored in stainless tanks. By 1960, it was hoped that the long-lived radio caesium would be extracted to produce radioactive sources on the megacurie scale for use in industrial processes. That would help the problem of storage of the remainder.

Other fission products, such as the radioactive gases were beginning to be extracted and stored and used for industrial purposes, helping thereby to reduce the contamination of the atmosphere. In the UK, the Wantage Radiation Laboratory, a close satellite of Harwell, was studying the use of the large sources of radioisotopes.

Radio Caesium Sources

The laboratory was now equipped with sources of radio cobalt of up to 10,000 curies and hoped in due course to equip itself with radio cobalt sources of 500,000 curies and later with still more powerful radio caesium sources. Those sources would be available for research by industry, Government departments and Atomic Energy Authority staff, into applications of radiation to chemical processes, to food preservation, to sterilisation and to other problems.

Much work has already been carried out in the US, where millions have been spent on investigating food preservation or the extension of storage life of food. Scientists working on food preservation were adopting combined methods of preservation using radiation plus light cooking of the food or an addition of antibiotics. Those combined operations looked very promising.

Radiation might also contribute to insect control. Work was being done on grain disinfestation. Although doses of 50,000 R were necessary to kill insects, much smaller doses sufficed to make their eggs infertile.

Sir John declared that radiation might be of great importance to the treatment of antibiotics. The dose to reduce bacteria by 10^8 was of the order of 2×10^6R. That dose produced a temperature rise of only 1-2°C and was therefore an ideal method for the treatment of heat sensitive drugs like penicillin, which at present had to be filtered from bacteria. Radiation might also be used in the final packaging and give safer drugs. Experiments had shown that the amounts of radiation necessary did not influence the potency of antibiotics like penicillin, streptomycin and others

The contribution that radiation makes to plant breeding was that it vastly increased the frequency of appearance of mutations by 50- or 100-fold or more and so provided a relatively simple means of greatly expanding the variability available to the plant breeder for selection. To that extent it was a most valuable supplement to the normal procedure of collecting and maintaining a representative sample of the natural variability of the crop for use in breeding programmes.

The first new strain developed by irradiation to go into production in the US was a bush type of bean derived from a vine type. It was developed from material treated with X-rays in 1941 and was released for the 1957 crop season. It was more tolerant of wet weather than the original type and less subject to disease and rotting. Extensive work with peanuts in the US had demonstrated the possibility of increasing through irradiation the genetic variability in respect of yield and by subsequent selection, accumulating favourable mutants into a more productive type.

Thermo-Nuclear Reactions. Referring to the 'glittering prospects of releasing energy from controlled thermo-nuclear reactions, properly known as fusion reactors,' Sir John said that to produce a practical thermo-nuclear reactor, the energy output must exceed the energy input. Radiation losses increased slowly with temperature, while the release of fusion energy increased very rapidly. For energy output to exceed input, temperatures of about 50 million degrees were required. That was likely to take much longer. Neutrons had already been observed by several groups of experimenters working with straight tubes in the USSR, the US and in this country, but those had been due to conventional accelerating processes by strong electric fields and not from high temperature plasmas.

Achieving High Temperatures

It was sometimes difficult to be sure of the origins of neutrons in that work; nevertheless, it was likely that temperatures of a few million degrees would be achieved shortly and with those fusion reactions would be produced by high temperature plasmas.

Sir John told his audience that in the UK, the AEA had recently put into operation a torus known as ZETA with the objective of reaching temperatures of several million degrees. 'Promising results have already been obtained but we require time for their interpretation.'

Safety Problems. The large scale development of nuclear power presented new safety problems, as well as problems of radiological control. The reactor design and codes of operation must ensure that temperatures could not rise sufficiently to melt fuel elements. Even if melting took place, the products must be contained within the reactor circuit or a containing

shell. Eventual extraction of the long-lived radio caesium to produce radio-active sources on the megacurie scale or for industrial processing would help. Other fission products, such as the radio-active gases, were beginning to be extracted and stored and used in industry, thus helping to reduce the contamination of the atmosphere.

Atomic Power Stations. By 1975, the Euratom plan would save 100 million tons of coal equivalent a year and the UK development might well save 40-50 million tons of coal equivalent. By 1967, the Euratom countries planned to install 15,000 megawatts of nuclear power stations. The latest forecast predicted 3-4,000 megawatts for the US by 1965 and 1,500 megawatts for USSR by about 1961.

The new Hinckley Point station of 500 mW output in 1962 would be followed by at least eight further great stations by 1965. In addition three stations of about 300 mW output each would be completed by 1960/61.

The UK concentration on the use of natural uranium entailed high capital costs but low fuel costs; the US pressurised water reactors had lower capital costs, but higher fuel costs due to the use of the more expensive enriched uranium fuel. Capital costs of the gas-cooled graphite moderated reactor were likely to fall rapidly with foreseeable increases of ratings and fuel temperatures of reactors and in the decade 1960-70 would probably fall 30 per cent.

Engineering improvements would play their part in increasing output and lowering capital costs between 1960 and 1965. Sir John also foresaw a major improvement in performance by changing from metallic fuels to ceramic fuels, such as uranium oxide by the mid-1960's. Those withstood higher temperatures and resisted radiation damage better than metal. By 1965-70, recycling of plutonium fuel would be well established and plutonium might be recycled with thorium as a fertile material to lead us into the thorium fuel cycle which was likely to have better nuclear characteristics than the uranium fuel cycle for thermal reactors. Experience of radiation damage of plutonium enriched fuels in some carriers had been very favourable.

The price of uranium oxide would probably fall below the $10 per lb. predicted in the US by 1965. If the problems of the fast reactor could be solved economically over the next few years, they would expect that plutonium from UK thermal reactor power stations would begin to be used as fuel for breeder power stations by the 1970's.

Sir John also predicted a bright future for the comparatively small power marine-type units using natural uranium or fuel of only low enrichment. These would have an application to land stations in the 30/30 mW output range. A large part of UK exports of conventional power units at present lay in that range, and the nuclear version would find application in the under-developed countries and for remote mining areas, where power costs were abnormally high; in some cases as high as 3d. If 20 mW nuclear power stations could be developed to produce power at about 1d. per unit, with a typical load factor of 50 per cent., they would find a ready use. The prospects here would be good by the mid-1960's.

ICI Increase Terylene Capacity but cease Ardil Production

FURTHER increase of capacity of 20 million lb. a year of Terylene polyester fibre, involving the building of a new plant at Wilton was announced by Imperial Chemical Industries Ltd. on Monday. Estimated cost of the new plant and its supporting plants is £20 million. An extension of Terylene plant capacity from 22 million lb. to 30 million lb. a year is already under construction.

The new plant will increase output to 50 million lb. a year. (It is already in the process of being raised by eight million lb. a year) at which level it will almost meet the production of nylon (output of nylon polymer is expected to reach 60 million lb. a year when the latest plant extension is completed). Total investment by ICI in Terylene will be about £48 million.

Terylene has been produced on a commercial scale since 1954, when the first 11 million lb.-a-year plant began production at Wilton. Even before the completion of this plant, plans to double this capacity were announced. This second plant came into operation in the summer of 1956. Scheduled for completion at the end of next year, is the eight million lb. increase in capacity bringing Terylene capacity up to 30 million lb. a year. No date has been fixed for the completion of the latest stage.

Plans, however, are stated to be well advanced in the fibres division for the further 20 milljon lb. a year. It has not yet been decided when construction work will begin.

Largest outlet for Terylene appears to be in men's suits and sports trousers and women's skirts. Industrially the fibre is being used in tyre manufacture, ropes, tarpaulins, filter cloths, fire hoses, conveyor belts. Terylene is also used as a film—Melinex film.

Simultaneously with the announcement that Terylene manufacture was to be increased, ICI stated that as progress of the Ardil project had been disappointing, it had been decided that manufacture should cease. Construction work on the Ardil plant at Dumfries began in 1949, and was completed in 1951 at a cost of £2½ million. Capacity of the plant was 22 million lb. a year. Ardil has proved difficult to dye, and due to its weakness had to be blended with natural fibres for strength.

All the technical staff at the Ardil plant have accepted ICI's offer of alternative employment, either on Terylene research and development work at Harrogate or Fleetwood or on the supervisory side of the Terylene plant at Wilton.

The 220 male workers at the plant are being offered the opportunity of taking work at the ICI Wilton plant. Those who accept transfer will receive generous financial assistance. Those workers who feel unable to accept ICI's offer and who have more than three years' service with the company, will receive a gratuity.

New Chemical Projects in the UK

A special summary of new chemical plants opened in the UK since January of this year and a 'progress report' on projects under construction or in the planning stage will be featured in *Chemical Age* next week. This summary devised for easy reading will give name of company, nature of the project in hand, and notes of when it will come on stream or the present stage of construction.

The issue, our annual edition dealing with chemical plant and equipment, will also include special articles by experts on various construction materials, including the noble metals, process control, new ideas in filtration, and a review of chemical plant and equipment.

A limited number of extra copies will be available and may be reserved by contacting Mr. H. A. Willmott, manager, at 154 Fleet Street, London EC4.

Serious Damage Prevented at Liverpool Fire

AN explosion in thinning room No. 2 at the works of Beck, Koller and Co. (England) Ltd., manufacturers of synthetic resins, Hunts Cross, Liverpool, blew the asbestos tiles off the roof and shattered the windows and caused damage to the windows and rooms of other buildings. Two men suffered burns and were saved from more serious injury because the door of the thinning room was closed and took much of the blast. The factory fire brigade extinguished the blaze before the arrival of the Liverpool fire service. A spokesman for the company stated that the fire was not serious and production was not likely to be affected. Thinning room No. 2 is separated from the other departments, otherwise there might have been a more serious fire and considerably more damage.

Voss Instruments on Show

At this year's exhibition of scientific instruments to be held from 2 to 9 October at Utrecht, Voss Instruments Ltd., Maldon, Essex, are showing several of their industrial stirrers and laboratory units. The industrial units include a 1 h.p. stirrer with vortex propeller and a ¼ h.p. unit with clamp fitting and 3-blade propeller stirrer

More Organic Chemical Plants Under Construction in Germany

THE end of the holiday season finds the German chemical industry ready for a further steady improvement in sales, though few producers expect the high expansion rate of the first half of 1957 to be maintained. In the first six months of this year, West German chemical sales rose to DM. 8,370 million, i.e., by 14 per cent compared with a growth rate of 8 per cent for West German industry in general. The production index for chemicals rose to 220 (1938 = 100), or 13 per cent more than in the first half of the preceding year, and average prices advanced by less than 1 per cent, according to official calculations. All these figures are more favourable than those for West German industry in general, and it has been noted that output and sales of chemical products for direct consumption shared fully in the improvement this year.

Leading producers have gone on record for the view that 1957 will again be a very satisfactory year both as regards volume of sales and prices. Productive capacity has risen so fast in recent years, however, that it now meets all requirements except in a few fields like raw materials for plastics manufacture where demand is still increasing faster than supply.

Smaller manufacturers complain that they find it difficult to secure capital for necessary plant extensions and that the increase in producing costs, resulting chiefly from high amortisation needs of costly new plant, introduction of a 45-hour week in May, and gradual increases in wages and social contributions, seriously affect profits. With many large and small producers shipping an average of one-third of all sales to foreign markets, the severe competition abroad is said to reduce profit margins.

Plastics Expansion

Fastest growing section of West German chemical production is the plastics industry which raised its output to an estimated DM. 800 million in the first half of 1957, compared with DM. 1,182 million in the whole of 1956. Over 20 per cent of the plastics output is made into foils and leather substitutes, approximately 15 per cent goes into the electrical trades, and 5 per cent each are now taken by kitchenware and wrapper manufacturers. Plastics have already passed their best as far as sales for protective clothing are concerned, and recent changes in the commodity markets are believed to threaten their prospects in certain other fields into which they penetrated as cheap substitutes.

A substantial increase to German methanol producing capacity will result from work now in progress at the Union Rheinische Braunkohlen Kraftstoff plant at Wesseling. Union last year accounted for about half the West German methanol production of about 210,000 tons and is now increasing its capacity by 35,000 to 40,000 tons to substantially more than 150,000 tons a year. The company differs from other German methanol producers in that it does not itself process the product but sells the entire output to manufacturers in the Federal Republic and neighbouring countries, and in using lignite as its raw material; lignite producers in the Rhineland hold 94 per cent of the company's capital. The expansion now under way will take care of the additional demands likely to arise for a number of years.

Ruhrchemie AG, the company formed in 1927 as a collective enterprise of Ruhr coal mines for the development of their chemical interests which has lately concentrated on the refining of mineral oil, are entering into closer relations with the Haniel group to which Rheinpreussen AG für Bergbau und Chemie belong. Ruhrchemie and Rheinpreussen are to co-operate in the hydrocarbons field, and in this connection Ruhrchemie will erect a polythene plant with an initial output capacity of 12,000 tons a year. It is reported that Farbwerke Hoechst intend to acquire a financial interest in Ruhrchemie AG.

Scholven-Chemie AG, who are indirectly owned by the Federal Republic, have doubled their share capital which stood at DM. 40 million, chiefly for financing the extension of their refinery to an annual throughput capacity of 2 million tons. The company started up a new compound fertiliser plant before the end of last year and raised its nitrogen output in 1956 to 51,400 (1955: 37,300) tons.

The synthetic rubber plant under construction at Marl, near Recklinghausen, will start operations in early summer next year, according to the latest information. Bunawerke Hüls GmbH a few weeks ago raised their capital from the nominal sum of DM. 120,000 to DM. 42 million, of which Chemische Werke Hüls AG provided half and BASF, Farbenfabriken Bayer and Farbwerke Hoechst one-sixth each. Additional long-term finance will be provided both by the shareowners and by a group of West German banks. The output capacity will be 45,000 to 50,000 tons of cold rubber—about one-quarter of West German requirements—but can be extended easily under existing plans.

Chemische Werke Hüls AG have had to look abroad for outlets for most of the additional output which became available from new plants last year. While home sales rose to DM. 306 (286) million, exports increased to DM. 171.4 (141.5) million. The rate of plant investment was fully maintained last year with capital expenditure of DM. 73 million, bringing the total amount invested since the currency reform to DM. 332 million. The principal new plants were for the production of acetylene, p.v.c., ethylene oxide, tetrapropylene benzene and trichloroethylene. In view of the success of the low-pressure polythene plant, the company is now engaged on the design of a large-scale plant for this product. The main research subject is work on the possibility of producing from an olefine basis the intermediates now derived from acetylene.

Courtaulds—Celanese Reorganisation

FOLLOWING the merger earlier this year between Courtaulds Ltd. and British Celanese Ltd., British Celanese will in future be responsible for the production and marketing of acetate yarns, fibres and similar products of the two companies. British Celanese will use their own trade marks as well as those of Courtaulds for acetate products. Eventually, the yarn sales organisations of both companies will be combined.

Lustre Fibres, the overseas distributors of Courtaulds' yarns and fibres, will also handle British Celanese products in export markets.

The fabric divisions of the two companies are to be amalgamated and a new textile division is to be set up which will be responsible for the production, dyeing and finishing of all knitted and woven fabrics for the group.

Courtaulds will continue to produce and market separately their production of viscose yarn and staple and of industrial yarns, such as high tenacity viscose yarns. Production and development of acrylic fibres, polythene and regenerated protein fibres will also continue a purely Courtaulds' interest.

The plastics interests of the two companies, will, however, be combined. Courtaulds' interest in British Nylon Spinners is not affected by this reorganisation.

Courtaulds' new Fibro factory on the Humber Bank near Great Coates came into operation last April. This plant, which is the most up-to-date in the world, has been built on a 500-acre site which was selected after Courtaulds had made an investigation of industrial sites in various parts of the country. The site is large enough to allow for considerable expansion of production, and in this connection Courtaulds announced earlier this year that a full-scale commercial plant for Courtelle, another type of man-made fibre which they produce, will be in operation at the Grimsby site by early 1959. The first section of this plant is nearing completion.

The Fibro factory will initially employ between 400 and 500 people, mostly men. Main raw materials are cellulose in the form of wood pulp and various chemicals required for converting this cellulose into a textile fibre, for example caustic soda, carbon disulphide and sulphuric acid. The process also requires a constant and abundant supply of water. Steam and electricity are supplied from the factory's own power house.

Existing production at other Courtaulds' factories is well over 200 million lb. per year; the new Grimsby plant has capacity for a further 100 million lb. per year. Fibro can be used either alone or with cotton, nylon, wool and other fibres. Its uses, which are continually being developed and extended, now range from surgical dressings through the whole field of apparel including underwear, dresswear and suitings to the new tufted carpets for which viscose rayon staple is the principal fibre used.

★ MEMBERS of the Birmingham branch of the Incorporated Plant Engineers have Alembic to thank for the fact that they will have a lecturer at their meeting this week. He is Dr. K. W. J. Bowen of ICI metals division who had been briefed to give his paper on 'Titanium as a material of construction in the chemical industry' at a branch meeting on 17 September in a Coventry hotel.

It appears that Dr. Bowen had not been provided with a copy of the branch programme, in which it was subsequently noted that the meeting would be held in the Imperial Hotel, Birmingham. He was, therefore, fully prepared to head for Coventry, when Alembic gave him details of the programme.

★ THE REASON why ICI were first in the field when the Foreign Secretary recently announced relaxation of the strategic embargo on goods for Communist China is given in the latest edition of *ICI Magazine*. As soon as the announcement was made, the dyestuffs division at Manchester cabled the company office in Hongkong offering supplies of rubber chemicals.

Within four days a reply was received ordering 23 tons of Vulcafor MBT, a chemical used in the vulcanisation of rubber. It was, of course, known that China had been using Soviet Russia as a buying agent for materials that could not be imported directly.

It had been permissible to ship natural rubber to China, for some time, but not the chemicals needed for the manufacture of such products as tyres. The dyestuffs division now has good hopes of establishing a worthwhile trade with Communist China for other rubber chemicals.

★ THE CONTRIBUTION that fuel conservation surveys can make to productivity could hardly be more aptly illustrated than the reduction of the time of the drying cycle at a north-west plastics firm from 56 to 12-18 hours. This is reported on page 449. The saving here was made possible by the work of the National Industrial Fuel Efficiency Service.

A very great deal more could be done if the Government were to make more money available for this work. The sum would be very small in comparison with the £millions that are quite rightly to be spent on developing atomic power stations. Fuel conservation can be of immediate benefit to industry; atomic energy will be so, but that is a long term policy.

When Alembic talked to Sir Leslie Hollinghurst, NIFES chairman, about this he wholeheartedly agreed that there was a lack of balance between Government spending on atomic power schemes and the relatively modest needs of his organisation. He calculated that £100-150 million could be saved every year by fuel efficiency methods.

Alembic was also interested in the suggestion of Mr Leslie Jenkins an executive council member of the National Union of Mfrs and a NIFES director, who thought that as boiler stoking was highly skilled, examinations should be made compulsory for boiler house operatives. At present any labourer can, and often does, stoke boilers. Mr. Jenkins admitted that trade union difficulties would have to be overcome. What did his fellow NIFES director, Mr. Jack Tanner, past-chairman of the TUC, think? He told Alembic that he agreed, in principle.

★ FOURTEEN nations have agreed on a world programme for the introduction of nuclear energy standards. This probably represents the first instance in the history of technology in which attempts have been made to secure international agreement on standard practices before national usage has become hardened.

The work is being undertaken by a new committee of the ISO (International Organisation for Standardisation) whose first meeting in Geneva recently was attended by 61 delegates from 14 nations, including the UK, the US and the USSR. Without impinging on the design and technical development of nuclear equipment, the new committee is to work on a programme aimed at facilitating world trade in installations for, and the products of, nuclear energy.

Three permanent sub-committees, led by US, UK and French chairmen, will deal with the following projects: a tri-lingual glossary of terms (in English, French and Russian); development of a warning symbol for use wherever ionising danger is present; adoption of units pertaining to nuclear energy developed by the International Commissions on Radiation Protection and Radiological Units; development of symbols for drawing; international recommendations relating to measurement of radiation and protection against radiation; development of guides for safe design, operation and maintenance of nuclear reactors.

★ DURING a recent official spot check, all scales in every Wisconsin fertiliser plant were tested and bagged fertiliser ready for despatch was check-weighed. The results were disconcerting. More than 40 per cent of the scales were more inaccurate than the permitted plus or minus 1/10th of 1 per cent. In some cases, 10 per cent errors were found.

Although the discrepancies in bags were 'not bad', they amounted in total to a short-weight of 1,425 tons of fertiliser when applied as an average short-weight factor to the total tonnage produced at the various plants.

It is not made clear in the report of the Wisconsin Weights and Measures Department whether many firms used modern automatic measuring, weighing and bagging methods, but Alembic assumes that most larger plants have adopted them. The more that automatic equipment is used for weighing the more the moving parts of the scale are exposed to corrosion damage and dust interference.

Alembic wonders how UK fertiliser manufacturers, whose much higher proportion of granular fertiliser is largely produced by continuous processes and whose bagging is widely mechanised in combination with weighing, would fare under such a check? The risk of error cuts both ways—overweight reduces slender margins; underweight is liable to cost much in goodwill and reputation.

★ FIRST series of commercial TV programmes to be presented by ICI Ltd., will be watched with interest. The programmes, to start at 5 p.m. on 21 September, comprise a series of 15-minute features to be shown at monthly intervals at the same time on Saturdays until March.

Themes for the programmes will be: importance of paint in everyday life; the nation's water supplies, how they are kept clean and pure with the use of chlorine; synthetic fibres; salt, its importance to health and industry; discovery of polythene by ICI and its wide range of uses; modern drugs; and the fight against disease in Central Africa.

Each programme will be introduced by Jack Hulbert and a number of 'star' names in the theatre, sport and TV will take part. These include: Sir Alan Herbert, Sir Adolphe Abrahams, Jim Peters, Robert Nesbitt and Matt Busby. The ICI roundel will be shown at the end of each programme.

Company executives who will discuss ICI's contributions in different fields will include: John Adcock, technical service manager, paints division, J. R. Whinfield, joint discoverer of Terylene and a director of fibres division, E. G. Williams, a managing director of paints division, and directors of the pharmaceuticals division.

Alembic will watch viewing statistics with interest, to see how ICI programmes compete with BBC children's TV, which has Bunter of Greyfriars as a counter-attraction.

Alembic

BA ANNUAL MEETING IN DUBLIN

Chemistry Section Reviewed by Dr. Peter Schwarz

THE DUBLIN MEETING of the British Association for the Advancement of Science, which was held from 4 September to 11 September, was unique in one way; it was the first meeting of the Association to be held outside the British Commonwealth. 'We welcome members of the Association for the Advancement of Science'—said the notices in many shop windows. The omission of the origin of the Association may have been inspired only by the traders' fear of incurring the displeasure of ardent republicans, but perhaps it can be viewed more charitably, as a symptom of the increasingly international character of scientific work.

In any case, the association received a 'royal' welcome from its hosts (the City of Dublin, Trinity College and University College), and many members went home with the thought that if Dublin cannot compete with some British cities in the number and variety of industrial excursions, it makes up for this by its proverbial hospitality.

Sentimental Attachment

The Chemistry Section of the association has a special sentimental attachment to Dublin, because the first meeting of the section, under its present designation as 'section B', took place in that city in 1835. At this meeting, Edmund Davy, the professor of chemistry in the Royal Dublin Society and a cousin of Sir Humphry Davy, addressed the association on 'The comparative values of Irish and Virginian tobaccos.' It was therefore appropriate that Dr. J. W. Cook's presidential address, which we reported a fortnight ago (p. 357), should deal largely with the effects of tobacco.

As usual the chemistry section provided an interesting and varied programme of lectures which were integrated into five short symposia. The first of these, entitled *Biogenesis of natural products*, was organised and opened by the doyen of biosynthetic theorists, Professor Sir Robert Robinson. Sir Robert showed how various alkaloids can be related to amino-acid precursors in theory and sometimes in the laboratory, and he emphasised the importance of biosynthetic considerations in confirming or correcting the structural formulæ of natural products. Professor A. J. Birch discussed the evidence which suggests that many mould metabolites are built up from acetate units. Tracer work has confirmed that the carbon atoms which are attached to oxygen in mould products are generally derived from the carboxyl group of the acetate. Professor T. S. Wheeler surveyed work which indicates that acetate units are also involved in the biosynthesis of part of the flavonoid molecule, the remainder being derived from carbohydrate probably via shikhimic acid. Lichen substances (depsides), natural anthraquinones, tropolones and other natural products were discussed in terms of C_8 units by Professor T. R. Seshadri. In the final paper, Dr. G. J. Popjak described elegant and important isotopic tracer work which indicates that cholesterol is synthesised in nature from acetate via mevalonic lactone, squalene and lanosterol.

Taken as a whole, the symposium brought out two points; first, that acetate is very important in biosynthesis, and second, that nature often turns out to be more complicated than the organic chemist's speculations.

Professor Charles Kemball was the chairman at the second symposium, *Making and breaking polymer molecules*. It was opened by Dr. L. Bateman, who emphasised the ever-growing importance of rubbers, plastics and fibres, and the consequent significance of advances which enable polymer molecules to be synthesised efficiently and in a controlled manner. Dr. Bateman also discussed the evidence which points to the formation of large free radicals when polymers are sheared, and he used a macerating machine to demonstrate how these radicals will initiate the polymerisation of added monomers to form versatile 'block co-polymers'. Another important recent advance, namely, the use of Ziegler catalysts, was surveyed in a stimulating lecture by the eminent American polymer chemist, Professor H. F. Mark. (CHEMICAL AGE, 14 September, p. 406.)

Synthetic Polypeptides

The synthetic polypeptides discussed by Dr. C. H. Bamford are important for a different reason. These macromolecules may be regarded as simple protein models and they can be used in studying protein problems. For example, the molecules of the synthetic polypeptides readily take up helical conformations, and 'denaturation' of the compounds can be shown to involve a change in conformation to a straight chain structure. Finally Dr. C. W. Bunn discussed the way in which the physical properties of polymers depend on their molecular structure. An understanding of this is obviously important in helping the polymer chemist towards his goal of producing 'tailor-made' polymers to meet any specification of physical properties.

One hundred years ago last month Pasteur published his first paper on alcoholic fermentation and, as brewing is the most important industry in Dublin, it is doubly appropriate that this year's BA should include a symposium entitled *Biology of yeast*. For this meeting the chemists joined forces with the botanists, and two of the papers were of mainly botanical interest ('Recent advances in yeast genetics' by Professor D. G. Catcheside, F.R.S., and 'Cell structure and function in yeast' by Professor E. J. Conway, F.R.S.). The chemists were catered for by a lucid account of the biochemistry of alcoholic fermentation given by Dr. R. Davies and a paper on the industrial aspects of yeast by Mr. R. B. Gilliland of the Guinness brewery. After outlining the well-known Embden-Meyerhof-Parnas mechanism of glycolytic breakdown, Dr. Davies considered the transport of substances through the cell membrane. This occurs not by mere diffusion, but under the action of enzymes called permeases, and the specificity of these enzymes explains the remarkable fact that certain yeasts ferment maltose more rapidly than glucose.

Mr. Gilliland drew attention to the wide differences in properties between the yeasts required by various industries, and pointed out that a knowledge of yeast genetics is valuable in breeding and maintaining yeasts for particular purposes. Mr. Gilliland then considered the flocculation of brewing yeasts; this is genetically controlled and is also dependent on a variety of external factors such as the presence of calcium ions and the surface tension of the wort. The hilarious discussion which followed led to the conclusion that, thanks to their unpleasant flavour, food yeast cutlets are unlikely to appear on the menus of the more exclusive restaurants.

Nobelium

A special session was devoted to the recently-prepared element No. 102, which has been called nobelium (pronounced nobelium. *See* CHEMICAL AGE, 14 September, p. 406.)

The last symposium of the meeting, *Chemistry in the service of agriculture*, was again of local interest, as agriculture is the major industry of Ireland. The world-wide importance of this industry was emphasised by Mr. A. W. Marsden, who summarised the contribution of chemistry to agriculture under six headings: soil evaluation, fertilisers, pest control, weed eradication, animal nutrition and the processing of agricultural products. Soil evaluation was discussed in greater detail by Dr. T. Walsh, who stressed the difficulty of evaluating soil fertility in view of the large number of factors involved. Dr. Walsh also referred to the significance of trace elements like cobalt, molybdenum, copper and selenium. Many of the points made in his lecture were illustrated in the Agricultural Science exhibition in the Great Hall of University College. This exhibition also illustrated the effects of fertilisers, which were discussed in the symposium by Mr. J. W. Parkes of W. and H. M. Goulding, Ltd., who surveyed the history of the Irish fertiliser industry in which his firm has played a major role. He pointed out that Sir James Murray, an Irish physician, must be given credit for the introduction of water-soluble phosphate fertilisers. J. B. Lawes is usually credited with this development, but Murray's independent work was the subject of a patent which was later bought by Lawes.

Finally, Dr. P. W. Brian gave a stimulating account of three kinds of plant hormones (*see* p. 448).

The whole symposium raised the hope

that, in the not-too-distant future, chemistry may help the farmer to control the rate of growth, size, habit and flowering time of his crops.

Many chemists were attracted to the exhibition in the Department of Chemistry of University College, where objects of historical interest and models illustrating orbitals and stereochemistry were displayed. Perhaps the most interesting of the exhibits were the documents relating to William Higgins, F.R.S., whose book, 'The Comparative View of the Phlogistic and Antiphlogistic Theories' (published in 1789), shows that he anticipated Dalton in some respects in the application of the atomic theory to chemistry.

As usual, the other sections of the association provided tempting programmes, and many chemists played truant. Some went to symposia on photosynthesis and on cancer, some listened to entertaining lectures on Irish archaeology and folklore, and others were attracted by such titles as 'Do sheep sleep?' (They do.)

The section dinner, which was held in the dining hall of Trinity College, was a great success. Speakers included the president, Sir Richard Levinge and Major Vivion de Valera. Sir Alexander Fleck, president-elect of the association, replied to the toast of 'the guests', and all who were present to hear his witty and incisive speech will look forward to his presidential address at next year's meeting of the association, which will be held in Glasgow.

Summaries of Chemistry Section Papers

IN recent years much time and thought have been devoted to deriving possible schemes of biogenesis of flavonoids and other natural products, stated Professor T. S. Wheeler in his paper on '*The biogenesis of natural products*' delivered to the chemistry (B) section of the BA meeting on 6 September.

When considering the biogenesis of flavonoids it was significant, he said, that there was a large group of natural products the basic structure of which comprised nine carbon atoms involving a six-carbon unit linked to a three-carbon unit. This had suggested to Sir Robert Robinson that the biogenesis of flavonoids included the condensation of a six-carbon with a nine-carbon unit. Recent work in a number of laboratories using radioactive carbon had given precision to this view.

Application of the tracer method to the synthesis of flavonoids had thrown much light on the biogenetic phenomena involved. Plants which produced a flavonoid called quercetin had been fed with labelled compounds. The compounds chosen were those believed to be the precursors of flavonoids in the plant. By noting which labelled compound gave the greatest amount of radioactivity in the quercetin formed it was possible to obtain accurate information on the course of the biosynthesis. Other methods which had been employed involved the use of mutant strains of algae to determine which of a number of test substances were metabolised into quercetin. The evidence was conclusive in support of Sir Robert Robinson's view.

Occurrence of C_8 Units in Plant Hormones

Since so many different groups of compounds occurring in plants were found to contain the C_8 unit, it should be considered to be a major structural unit. This was the conclusion reached by Professor T. R. Seshadri, when he discussed the occurrence of C_8 units in plant hormones. It had been shown that the C_8 (orsellenic) unit was an important unit occurring widely in plant products. The first groups of compounds in which this was found largely were the depsides and depsidones present in lichens. These, said the Professor, constituted efficient symbiotic systems containing both algae and fungi. A study of the structure of the numerous naturally occurring depsides and depsidones revealed the important modifications, which the C_8 unit could undergo, and led to the conclusion that the earliest stage of the C_8 unit should be a hydroxyaldehyde derived from two molecules of a tetrose.

Considerable importance had been attached to the chemistry of mould products in recent years. A number of chemical compounds were found to be common to both fungi and lichens. Further, it was considered that it was the fungal part of lichens that synthesised typical lichen acids. This relationship led to the application of the C_8 unit rule to mould products also. They have been considered under the main groups (1) benzene derivatives, (2) Toluquinone derivatives and (3) anthraquinone derivatives.

All three fell under the C_8 structural system, stated Professor Seshadri; the first two contained one C_8 unit per molecule, whereas the anthraquinones contained two such units. Tropolones consisted of a novel group of mould products having seven-carbon ring systems and aromatic properties. The important mould tropolones, stipitatic acid, puberulonic acid and puberulic acid were also derived from C_8 units (DHP units) and involved a process of ring expansion under conditions of oxidation. Dibenzofurans found in lichens viz., didymic acid and strepeilin were also made up of two C_8 units in each molecule.

All the above-mentioned groups of compounds constituted pure C_8 types but mixed types were found in naturally occurring xanthones and stilbenes. Lichexanthone and ravenelin, obtainable from lichens and moulds respectively, were found to contain the C_8 plus C_6 units, whereas stilbenes, stilbene carboxylic acids and dihydrophenyliso-coumarins resulted from the combination of C_8 and C_9 units.

Dr. Brain Discusses Plant Hormones

Practical advantages that have accrued from study of the auxins were plain for all to see as was shown by the widespread use of hormone-type selective weedkillers. This was stated by Dr. P. W. Brian in his paper on 'Plant hormones'. He discussed three kinds of plant hormone—the auxins, kinetin and gibberellic acid.

The most widespread natural auxin was indolylacetic acid, he said. Synthetic auxins similar to indolylacetic acid in general molecular structure were now used for such diverse purposes as stimulating rooting of stem-cuttings, improving fruit-set and, above all, as selective weedkillers. Discovery of the herbicidal properties of MCP and 2, 4-D had led to a considerable new chemical manufacture and has been of very great benefit to farmers all over the world. There were other natural auxins waiting to be purified. It was possible that some would turn out to be unrelated chemically to indolylacetic acid and might afford new models for chemical synthesis, resulting perhaps in compounds with new and unexpected biological properties.

Recent work on plant tissue culture had shown that other hormones beside the auxins might be involved in cell division. Cultures of some tissues multiplied indefinitely in defined media containing sucrose, mineral salts, certain vitamins and amino acids, and an auxin. Other tissues, e.g. tobacco pith, were more exacting and required substances present in such natural sources as coconut milk or yeast extract. Recently a pure substance named kinetin has been isolated by a group at Wisconsin University, which would to a great extent replace coconut milk or other natural additives. If kinetin was added to tobacco pith cultures at concentrations as low as one hundred-thousandth of a milligram per litre, it enabled such cultures to multiply indefinitely. It also had other remarkable properties: it increased leaf growth, stimulated rooting of cuttings in the presence of an auxin to an extent greater than that induced by the auxin alone, stimulated germination of some dormant seeds, but inhibited some of the cell-extension effects produced by auxins.

If a dilute solution of gibberellic acid was sprayed on a pea seedling, growth might be accelerated fourfold, so that the nature plant was correspondingly taller. It had a similar effect on many plant species. But its most novel and striking effects were on flowering. Some biennial plants, such as sugar-beet, did not usually flower until their second season of growth, the stimulus leading to production of the flowering shoot being exposed to low winter temperatures. When treated with gibberellic acid they proceeded to flower in their first season. If this was done to cabbage plants it was possible to produce flowering plants 12 feet high.

Practical uses of substances like gibberellic acid and kinetin could not be forecast until further experimental work was completed, but Dr. Brian suggested that by using the natural hormones, or synthetic substances modelled upon them, rate of growth, habit and flowering time of crops in the field could be modified to suit soil and weather conditions or other cultural requirements. In other words, it might eventually be possible to 'tailor' crop plants by chemical means to suit the farmer's convenience.

Biogenesis of Sterols Studied

Study of the biogenesis of sterols had established firmly the importance of an isopentane structure in the biological origin of a very large group of natural products, Dr. G. J. Popjak informed section B of

the BA Association in his paper on the biogenesis of sterols.

Study of the molecular structure of various natural products and the use of isotopic tracers in biochemical experiments had led, during the last fifteen years, to an almost complete understanding of sterol biogenesis. The first important discovery in relation to sterol synthesis was the observation that cholesterol was synthesised in animal cells from acetic acid. When it was established with the aid of carbon isotopes in what pattern the acetic acid carbons were arranged in the sterol molecule, the earlier hypothesis that squalene (formerly known to occur only in certain fish-oils) was an intermediate in the formation of sterols was successfully revived and experimentally proved to be correct. Knowledge of the molecular structure of lanosterol (isolated from wool fat) suggested that it was derived from the cyclisation of squalene and to be a precursor of cholesterol, the hypothesis again being proved right. At least three sterols were known to be formed in the course of transformation of lanosterol to cholesterol, said Dr. Popjak.

Until recently very little concrete evidence was available about the early stages of synthesis from acetate. Last year reported Dr. Popjak, a new substance (mevalonic lactone) was discovered in distillers soluble residues by a group of research workers at the Merck Research Laboratories in the US. The structure of this compound suggested the possibility that it might be an intermediate in the formation of squalene (and hence of sterols) from acetate. By the use of 14C-labelled mevalonic lactone it had been possible to show the direct utilisation of five out of its six carbon atoms in the formation of squalene and of sterol. As yet the formation of mevalonic lactone from acetic acid had not been demonstrated.

The sequence of reactions in sterol biogenesis was envisaged to proceed according to the series

acetic acid → mevalonic lactone → unidentified intermediate → squalene → lanosterol → at least 3 sterols → cholesterol.

Twice as Many Chemical Firms Use Fuel Efficiency Service

THE number of chemical manufacturers using the facilities of the National Industrial Fuel Efficiency Service was more than doubled in the year ended 31 March. For 1956/57, 29 firms had regular service agreements, against 11 in the year ended 31 March 1956. From 39 heat and power surveys made in the chemical industry, average savings of 14.2 per cent were recorded.

These facts are stated in the annual report of NIFES, whose head office is at 71 Grosvenor Street, London, W1.

During the year, NIFES engineers made 13,493 visits to factories, compared with 12,509 in the previous year. More than 2,000 premises were visited for the first time. Heat and power surveys in the chemical industry represented 8.4 per cent of the total number made, compared with 10.9 per cent in the previous year.

It is stated that 11 chemical firms took advantage of the special Government loan scheme, for conversion to oil, under which loans are made available, provided it can be shown that the results will be substantiated in relation to the expenditure. These 11 loans totalled £71,889 and resulted in oil replacing 13,192 tons of coal.

A further six chemical firms were granted loans for fuel saving schemes. The loans totalled £116,733 and 18,653 tons of coal were saved as a result. Loans for all types of oil conversion schemes totalled £864,765, with a replacement of 165,560 tons of coal. Fuel saving loans totalled £1,022,636 and 78,063 tons of coal were saved.

The value of a regular service agreement is illustrated in the report by an account of NIFES co-operation with the technical staff of Monsanto Chemicals Ltd., Ruabon. During the Suez crisis this plant, like others, was faced with a cut in oil supplies. The savings achieved by improved combustion arrangements, however, enabled the cut to be met comfortably and gave the firm confidence that their production programme could be maintained.

A firm manufacturing plastics in the north-west, which approached NIFES for advice, thought it should be possible to close down a small oil-fired boiler, which generated steam, by transferring the load to a coal-fired Lancashire boiler which served a high-pressure hot water system. It was found that 49 per cent of the steam was running to waste. By replacing a single steam trap, and other maintenance work, a saving of 12,600 gall. of oil a year, or 56 per cent of total consumption, was achieved.

It was found that not only could the small steam boiler be shut down, thus saving 22,500 gall. of oil, but that the coal used in the Lancashire boiler could be reduced by 90 tons a year, despite higher loading. The savings amounted to more than £1,500 a year.

On the process side at this plant, it was found possible to reduce the time of the drying cycle from 56 to 36 hours. The new drying technique introduced opened the way for the use of certain chemical additives with which the firm had been experimenting. These will further reduce the cycle to 12-18 hours.

The annual report also deals with the efficiency of the Lancashire boiler, and training and education schemes.

Petrochemicals Strike Ends

Three hundred construction workers engaged on extensions at Petrochemicals Ltd., Partington, resumed work on Tuesday. They had been on strike for a week. The strike was due to the contracting companies Wimpey and Lummus who employ them refusing to pay a lieu bonus which would bring rates into line with those paid on comparable sites elsewhere. Representatives of the Trade Unions' and employers are to meet this Friday in a bid to end the deadlock.

Brazil's Expanding Market for UK Chemicals

BRAZIL needs raw materials for industry and agriculture, including chemicals and fertilisers. Competitive prices and ready availability are the chief selling points for these commodities. This is stated in a special article on opportunities in Brazil for UK industry, written for the *Board of Trade Journal* by the commercial department of the British Embassy.

Good agency arrangements are, it is stated, not necessarily in themselves the key to success in chemicals. It has often been found difficult to persuade local importers to undertake direct representation for the sale of such goods, partly because of fluctuations in the auctions which oblige importers to shop around for the most attractive terms available. Since most of this business is seasonal, quotations are frequently sought by telegram.

It is stated that a prompt wired reply is essential if UK exporters wish to compete for business. Dilatory attention to enquiries of that nature is of no use.

Exports of UK chemicals to Brazil have risen rapidly in the past two years, and the trend continues. The value of UK chemical exports in 1955 is shown as £311,000; this rose more than seven-fold to £2,348,000 in 1956. The figure for the first six months of 1957 is £1,465,000.

Big Increase in Sadlers' By-Product Output

COKE, gas and by-products supplies will be increased by developments in hand by Sadler and Co. Ltd. chemical manufacturers, Middlesbrough, at their Randolph Coke Ovens, Evenwood, Co. Durham. Work on the installation of 11 additional Woodhall Duckham under-jet compound coke ovens and necessary extensions to ancilliary plant completes a modernisation scheme that was started in 1947.

When this plant came into operation early this month, the company was carbonising 600 tons of coal a day, a 60 per cent increase. It has also started to send proportionately higher tonnages of crude tar and crude benzole to the Middlesbrough works for distillation.

Work Starts on £60m. Nuclear Power Station

THE LARGEST atomic power station in the world, to be built at Hinkley Point in Somerset is now under construction by the English Electric, Babcock and Wilcox, Taylor Woodrow Group. The cost of the project is about £60 million, and the contract is believed to be one of the largest ever placed in this country.

The station is designed for a net electrical output of 500,000 kW, power being generated at 13.8kV to feed into the national supergrid. The site of the station covers 44 acres and the ground plan is no larger than that of current 300 MW stations. Two reactors are to be built, fuelled by natural uranium, of the gas-cooled graphite-moderated type. Each reactor will produce nearly 1,000 megawatts of heat, and they will be connected to six axial-flow gas circulators and six steam-raising units.

JAP PLASTICS OUTPUT EXCEEDS TARGET BY 40,000 TONS

LAST year, Japanese production of plastics exceeded the target set for these materials by 40,000 tons. By 1960, Japan is expected to produce more than 514,000 tons. If this present plan is realised, Japan's production of plastics will exceed that of Great Britain, where according to the journal *Plastics* the 500,000-ton mark is not expected to be reached until 1962. The result is likely to be considerable pressure in world markets by Japan.

Japanese Synthetics Trade (in tons)

	Imports		Exports	
	1955	1956	1955	1956
Phenol plastic ...	22	308	138	364
Polyvinyl resin ...	150	765	2,547	2,985
Polystyrol	—	7,930	—	5
Polychene	10,130	11,788	—	58
Acrylics ...	—	412	—	8
Cellulosics	337	327	2,507	3,412
Remaining synthetics	910	1,606	218	416
	11,549	23,136	5,410	6,974

It is expected that of the estimated production of 350,000 tons of synthetics in 1958, about 50,000 tons will be exported. Leading the Japanese plastics production is polyvinyl chloride. In 1956, 66,600 tons were produced. Production of this plastics material has grown up from Japan's carbide industry, which industry has developed to supply Japan with chemicals for fertilisers.

Main fertiliser company Shin Nippon Chisso Hiryo is now producing p.v.c. Also producing p.v.c. is the US-Japanese company, Japanese Geon Co., with a yearly output of 12,000 and the Monsanto Kasei Co. with a capacity of about 7,000 tons. In April this year, Shinetsu Chemical Co., with a capacity of 4,800 tons started up. In 1958, Japanese Geon will have at its Kambara and Takaoka works a capacity of 22,500 tons and Monsanto Kasei Co., a capacity of 13,000. The Toa Gosei Co., will also produce p.v.c. in conjunction with the French St. Gobain company.

The second leading plastics group is the urea resins. Again the first Japanese company to produce urea resins is also a fertiliser manufacturer, namely, Sumitomo Chemical Co. Others are Toyo Koatsu Co., Riken Gosei Co., Japan Reichhold Chemicals Co. These same companies with Denki Kagaku Gogyo K.K. also produce melamine resin.

Among the phenol resins producers, the largest is Sumitomo Bakelite Co., followed by Riken Gosei Co., and Japan Reichhold Chemicals Co.

For the production of polyester resin Toyo Koatsu Co., have a plant capacity o f 840 tons, Nihon Shokubai Co., 1,500 tons annual capacity, Hitachi Co., 1,200, while Japan Reichhold Chemicals Co. will raise its capacity by 1,200. This latter company is also the largest producer of alkyds. Silicones are produced by Shinetsu Chemical Co. Annual capacity of hitherto 480 tons, has recently been increased to 600 tons.

A main producer of polystyrol is Asahi-Dow Co., with a capacity of 3,300 tons. Monsanto Kasei Chemical Co., another producer, has a capacity of 3,000 tons.

This year Sumitomo Chemical Co., and Mitsui Petrochemical Co., have been named as producers of polythene. Sumitomo will use the ICI-high pressure process, Mitsui the Ziegler low-pressure process. Output of 10,000 tons in 1959 is aimed at by Mitsubishi Petrochemical Co., Showa Denko Co., and Furukawa Chemical Co. All these companies will use the low-pressure process. Showa Denko will employ the Phillips process and Furukawa, that of Standard Oil Co., Indiana. Polypropylene is also to be produced. Japan Petrochemical Co. will provide the raw material.

Japan's Synthetics Capacity (in tons)

	1956	1957		1960	
	Planned Production	Planned	Minimum capacity	Planned	Minimum capacity
Phenol resins ...	1,340 18,000	14,000	24,000	16,500	50,000
Urea resins	50,000 60,000	53,000	70,000	65,000	85,000
Melamine resins ...	3,400 4,100	5,450	6,200	8,800	10,000
Alkyds	6,200 7,500	6,600	8,000	8,500	11,000
Polyester	1,000 1,147	1,500	5,500	3,500	10,000
Silicone	300 480	400	700	700	1,000
Fluoro-	200 200	300	300	600	600
Polyvinyl chloride ...	55,000 69,600	60,000	75,000	72,000	101,000
Polyvinyl acetate ...	28,000 30,000	46,000	48,000	102,000	102,000
Polyvinyl alcohol ...	12,400 14,800	20,780	23,200	47,200	50,000
Acrylics	1,200 1,300	1,500	1,600	3,000	3,000
Polystyrol	1,100 —	6,300	8,000	12,000	13,000
Polythene	— —	10,000	15,000	25,000	45,000
Cellulosics (intrate and acetate)	7,300 8,500	14,200	18,600	29,500	32,000
	179,500 219,000	238,800	293,000	394,500	514,000

Civil Engineering of Acrilan Plant Now Completed

CIVIL engineering phase on the new £3½ million Acrilan synthetic fibre plant of Chemstrand Ltd. at Coleraine, Northern Ireland, has been completed. Costain-John Brown Ltd. who are engineering and constructing the plant have also established an office in Ulster.

Work on the plant began on 10 December 1956 and since then the foundations, structural steelwork in a process unit, and the north wing of the main manufacturing building have been completed. Erection of the superstructure is well under way and work generally is ahead of schedule. With the completion of civil engineering work, Costain-John Brown are about to start on the mechanical engineering phase.

The company's new Ulster office is temporarily sited at Coleraine, but as the amount of work increases and as industrial development in Northern Ireland progresses, the office will be moved to Belfast.

Intensive Boron Research Programme for Borax Consolidated

ALL aspects of boron chemistry are being covered in the new research programme now under way at the new laboratories of Borax Consolidated, situated at Chessington, Surrey. Existing buildings have been taken over and are being refitted as laboratories. There is a large laboratory in the main block and six smaller laboratories, each of which comprises a self-contained unit.

The research group of 25 chemists, headed by Dr. D. B. Clapp, started on the research programme earlier this year. It is planned to almost double the present number of staff in the near future so that research can be speeded up. In fact 20 of the present 25 joined the company in the first few months of this year.

Investigations which will be undertaken in the new laboratories will differ considerably from the previous work on which the company's old laboratories were engaged. One research team will be covering fundamental chemistry and the application of boron compounds in corrosion inhibition, timber preservation, flame-proofing, etc.

Organic chemistry of boron is being studied by another section. Again, the preparation and properties of elemental boron, boron halides and other related compounds are being investigated on a fundamental basis. Of particular interest to this section are materials having high temperature resistance and stability.

Reactions with boron compounds carried out at high temperatures will be the concern of a third section. It is understood no research is being carried out on boron compounds as fuels. These British laboratories are collaborating with the research laboratories of US Borax to avoid overlapping.

One laboratory which has plant of between laboratory scale and pilot plant is producing some boron tribromide, which the company can supply in small quantities.

A technical service group composed of scientific staff is attached to the new centre and is engaged on work for customers.

£4m. Extension Plan

Grangemouth Dean of Guild Court have passed plans from the British Petroleum Refinery (Grangemouth) Ltd. for alterations and new buildings at Bo'ness Road, including a crude-oil distillation plant, plus extra tankage, and offices (estimated cost, £4 million), and a causeway from Grangemouth Docks to carry oil pipes to the refining area (cost, £150,000).

India to Increase Output of Dyestuffs and Intermediates

Usage will Rise a Third by 1960

IMPORTS of dyestuffs into India have been increasing. In 1955–56, 5,850 tons valued at Rs.13.75 crores (£808,235) were imported. In 1956–57 the imports (for seven months) are valued at Rs.7.60 crores (£447,588). The development wing of the Ministry of Commerce and Industry has estimated the total Indian demand by 1960 at 7,000 tons valued at about Rs.20 crores per annum representing an increase of 30 per cent over the present consumption. According to another survey made by an ICI team, the annual requirements by 1965 are placed at 10,000 tons, taking into consideration the rising demand for cloth.

At a meeting of the representatives of the Government and industry, held recently in Bombay, the annual consumption of dyes by 1965 was estimated at 9,815 tons made up as follows: azo dyestuffs, 3,000 tons; basics, 750 tons; naphthols, 1,250 tons; fast bases, 1,250 tons; vats (absolute), 1,200 tons; sulphur black 2,150 tons; other sulphurs, 215 tons.

Self-sufficiency Target

During the Second Five-Year Plan, emphasis has been laid on the expansion of this industry particularly in regard to the production of intermediates in order to meet the country's requirements of finished dyes to the maximum possible extent. The NIDC is to undertake the manufacture of primary intermediates. The quantities of main raw materials that would be available for this purpose by 1960 are estimated as follows: Benzene, 9,262,000 gal.; toluene, 1,631,000 gal.; naphthalene, 6,800 tons. A large number of other important organic products are required also and for which capacity has to be developed. These include acetone, acetic acid, acetic acid anhydride, isopropanol, trichloroethylene, formaldehyde, formic acid, hexamethylene tetramine, isobutanol, methanol, oxalic acid, oxalic acid diethyl ether, phosgene, urea, calcium cyanamide, dicyanidiamide, thiourea and butanol.

Vitamins manufacture: A number of schemes for the manufacture of vitamins have been approved. Two are for the manufacture of synthetic vitamin A from lemongrass oil which is available in the country. Each of these schemes envisages an annual production of 10 million mega units of vitamin A valued at Rs.50 lakhs (£300,000 approx.).

A licence has been granted to a firm under the Industries (Development and Regulation) Act, for the manufacture of 1.2 kg. of vitamin B_{12} per year valued at Rs.12.37 lakhs (£72,765 approx.). Production is expected to start by March 1958.

Another scheme submitted by a firm for the manufacture of vitamins B_1, B_2, B_6, C and D is now under consideration. The question of producing some of these vitamins by the National Industrial Development Corporation (NIDC) is also being examined.

Licences have also been issued to two firms for the production of nicotinic acid and nicotinamide. The total capacity will be about 15 tons per year. One of the firms has already gone into production.

Production of orcinol: The feasibility of industrial production of orcinol from the lichen depside lecanoric acid has been investigated at the chemistry department of the University of Delhi, in view of the high price of the imported material (Re.1 per g.) (1s 2d) and abundance of lichen acids in the hilly and forest areas of the country.

Orcinol finds use as the starting material in a number of syntheses, as a stain for micro-organisms and in the preparation of the dye, orcein. At present there is no production capacity for orcinol in India.

Investigations have shown that pure orcinol could be produced at a cost of Rs.0.20 (2¾d. approx.) per g. from *Parmelia tinctorum*, which is the most readily available lichen in the country, by extracting the powdered material with acetone, washing the residue with benzene and hydrolysing the crude lecanoric acid using acetic acid. Acetic acid is removed under reduced pressure and the residue dissolved in water. The filtrate on evaporation gives crude orcinol. Pure orcinol as colourless plates and prisms is obtained on crystallisation from chloroform.

Furfuryl alcohol: Studies on the production of furfuryl alcohol by the vapour phase catalytic hydrogenation of furfuryl have been in progress at the Shri Ram Institute for Industrial Research, Delhi, under a research scheme financed by the Council of Scientific and Industrial Research.

A detailed study has been made of the variables in the hydrogenation reactions. Yields up to 90 to 92 per cent of furfuryl alcohol have been obtained by employing a large excess of hydrogen. Pilot plant studies are being planned.

Nicotine sulphate from tobacco waste: At the National Chemical Laboratory, Poona, a process for the extraction of nicotine sulphate from tobacco waste has been developed. A regional licence for the commercial exploitation of the process has been granted to Tobacco By-products Ltd., who are erecting a plant at Guntur (Andhra State) for its production.

Tobacco waste is abundantly available in India, the estimated availability being 40 million lb. per annum. Waste containing even less than 2 per cent nicotine can be utilised.

Tobacco waste is pulverised and mixed with about 20 per cent by weight of soda ash. Sufficient water is added to wet the mixture uniformly. The mass is transferred to conical percolators and extracted with kerosene oil. The rate of draw-off of extract from the percolators is controlled to secure high extraction efficiency.

Residue Extracted

The tobacco remaining in the percolators is removed to a press and the residual extract squeezed out. It is mixed with the extract from the percolator and treated under stirring with dilute sulphuric acid (35° Be). On standing, nicotine sulphate solution separates as a bottom layer and is drawn off. It is bottled for sale after adjusting the concentration to 40 per cent. The recovery of nicotine is about 95 per cent.

The de-nicotinised kerosene, which is of a greenish colour, is purified by distillation and recycled to the percolators.

Recovery of nickel from spent nickel catalyst: Due to the shortage of nickel in India, increasing attention is being paid to the utilisation of available sources, such as the spent nickel catalyst obtained as a waste in the fat hydrogenation industry. Investigations on the problem undertaken at the Department of Chemical Technology, Bombay University, have shown that over 90 to 93 per cent nickel could be recovered from spent nickel catalyst in a single digestion with inorganic acids when used in theoretical amounts, as also with formic acid when used in slight excess.

Titanium tetraiodide: Titanium is normally prepared commercially by the reduction of titanium tetrachloride with sodium or magnesium. Ductile titanium of higher purity may be made by the Van Arkel process by the dissociation of titanium tetraiodide on a hot tungsten filament. This is primarily a refining process, in that iodine and crude titanium are the starting materials.

A new method (Indian Pat. 54676) developed at the National Metallurgical Laboratory, Jamshedpur, consists of heating aluminium, iodine and titanium dioxide in a sealed evacuated glass vessel at 400°C. to 500°C. Yields of titanium tetraiodide corresponding to 60 per cent reaction of titanium dioxide have been obtained.

Refining and modification of sugarcane wax: Refining and modification of sugarcane wax has been investigated at the National Chemical Laboratory, Poona

New Developments in India

- **Indian dyestuffs imports have been increasing. Expansion of the industry in relation to annual consumption and raw material demand.**
- **Schemes to manufacture vitamin A and vitamins of the B group, including B_{12}.**
- **Furfuryl alcohol production: pilot plant studies planned.**
- **Process to obtain nicotine sulphate from tobacco waste developed.**
- **Indian patent for production of titanium tetraiodide.**
- **Recovery process for potassium chloride and magnesium carbonate from sea bitterns.**
- **Pilot plant project for phthalic anhydride production.**
- **Sulphuric acid plant and superphosphate installations completed at Avadi, near Madras.**

from which a new process has been developed. This involves bleaching of the crude wax with potassium dichromate and sulphuric acid and chemical modification of the bleached wax by preparing its esters and amide derivatives. Dichromate-sulphuric acid treatment of cane wax has been investigated by several acid treatment workers previously. The importance of the present work lies in effectively modifying the bleached wax to obtain waxes possessing the requisite solvent take-up and retention properties.

Investigations have been conducted on a bench scale in the laboratory and yields of bleached wax to the extent of 70 to 80 per cent of the crude have been obtained. In the preparation of modified wax from bleached wax, the yields are of the order of 95 to 100 per cent. The equipment required includes lead-lined direct-fired or steam-jacketed reactors, crystallisers, grinders and flaking unit. All the items can be easily fabricated.

Sugarcane Wax

Refined and modified sugarcane wax has been found to replace satisfactorily carnauba and other waxes used in the production of leather and floor polishes, carbon papers, printing inks, varnishes, etc. Nearly 4,500 cwt. of waxes other than paraffin wax valued at Rs.10–12 lakhs (£58,823 to £70,588 approx.) are imported by India every year, apart from wax compositions valued at Rs.10 lakhs (£58,823 approx.).

Potassium chloride and magnesium carbonate from sea bitterns: A process for the recovery of potassium chloride from waste sea bitterns has been worked out at the Central Salt Research Institute, Bhavnagar. It consists of removing the sulphate from the bitterns by adding commercial calcium chloride and concentrating the desulphated bitterns to yield a double salt, carnallite. Potassium chloride is recovered from carnallite by dissolving it in water, concentrating to supersaturation point and cooling. Purity of the potassium chloride obtained is 97 to 99 per cent with an overall yield of 85 to 90 per cent.

A carbonation ammoniation process has been developed for converting the magnesium salts of sea bitterns into light magnesium carbonate and for fixing the potash content in the form of a mixed nitro-potash fertiliser. The light magnesium carbonate obtained as a by-product has a bulk density of 130 g./1,000 cc. and is found to be suitable as a filler in rubber industry. The nitro-potash obtained contains 18 to 19 per cent available nitrogen and 4 to 5 per cent potash.

Calcium lactate industry: The Indian Tariff Commission is inquiring into the question of continuance of protection to the calcium lactate industry. In 1953 the annual demand for the chemical was estimated by the Commission at 50 tons with possibility of increase to 60 tons during the next three years. The aggregate production and imports in 1955 amounted to 56.33 tons.

In 1953 there were three units engaged in the production of calcium lactate, namely, Sarabhai Chemicals, Calcutta Chemical Co. Ltd., and Alembic Chemical Works Ltd., with an aggregate production capacity of 162 tons. During the last three years, calcium lactate has been imported mainly from UK. Since April 1956 the product has been also imported from China, which now constitutes the cheapest source of supply.

Present rates of protective duties for calcium lactate are 37.8 per cent ad valorem standard and 37.3 per cent ad valorem preferential.

Pilot plant for phthalic anhydride: The National Research Development Corporation, New Delhi, has sanctioned the setting up of a project for the design and fabrication of a pilot plant for production of phthalic anhydride from coal-tar oils by fluidised bed oxidation. The project, which will cost Rs.2 lakhs, (about £11,666) is based on a process (Ind. Pat. No. 54090) developed at the Central Fuel Research Institute, Jealgora. The process has been tried on semi-pilot plant scale (capacity 5 lb. per 8 hr.) by the Institute.

The plant will be designed and fabricated at the Shri Ram Institute for Industrial Research, Delhi, and installed at the Central Fuel Research Institute, Jealgora.

New sulphuric acid plant: Shaw Wallace and Co. Ltd. have just completed the installation of their new sulphuric acid plant and superphosphate factory at Avadi, near Madras; production began on 1 April 1957. The acid plant, designed by Simon-Carves Ltd., Stockport, is a 20-ton contact plant using a Monsanto vanadium catalyst. The superphosphate factory comprises a ring mill with cyclone air separator of the latest design which is used to produce ground rock phosphate of the required fineness, and a Broadfield acidulating unit with a capacity of 6 to 10 tons superphosphate per hour.

National Rayon Corporation: The Indian Government have granted a licence to the National Rayon Corporation Ltd., Bombay, for the fabrication of machinery for rayon, sulphuric acid, carbon disulphide and caustic soda manufacture and for water filtration and softening plants and auxiliary equipment. The firm has already made a beginning with sulphuric acid plant and is in a position to offer complete contact process units.

The research department of the firm has been expanded and is mainly concerned with manufacture of viscose yarn and rayon tyre cord on a pilot plant scale and utilisation of chlorine from caustic soda plants in the manufacture of chlorine compounds.

Karbogel: The National Research Development Corporation has granted a licence for the commercial development of Indian Patent No. 54264 relating to Karbogel to Bird and Co. Private Ltd., Calcutta.

Karbogel is a desiccant and dehumidifier developed from coal at the Central Fuel Research Institute, Jealgora. The material finds use as a moisture adsorbent and desiccant for drying of gases, air conditioning, etc. It has certain special advantage over silica gel and other desiccants commonly used for commercial purposes.

Commercial metric weights: The details of the commercial weights based on the metric system, which would be put into use when the changeover to the metric system begins on 1 April 1958 have been finalised by the Indian Standards Institution. A specification (IS:1056–1957) giving details in respect of dimensions, materials and tolerances of the different series of weights prescribed has been issued. The standard specifies the use of cast iron and forged steel, brass and bronze and sheet metals for different types of weights used for ordinary trade transactions, bullion trade, etc. The standard for commercial weights is available at Rs.2 (2s 4d) per copy at ISI headquarters at 19 University Road, Delhi-8.

Proban's New Anti-Flame Process Launched

A NEW durable anti-flame finish for fabrics was introduced to the textile industry last week. Proban is the trade name for the finish developed by Albright and Wilson Ltd. and the Bradford Dyers Association, who brought the process from two American government chemists, Guthrie and Reeves, and patented it throughout the world outside the US. It is hoped that the finish will have a wide range of applications, not only for treating fabrics in everyday use, but for industrial clothing. It is claimed that Proban-treated fabrics will resist bacteria, fungi and mildew as well as flame.

Protective clothing in Proban being used in the sodium plant of Associated Ethyl

The essential constituent of the finish is a phosphorus compound, tetrakis-hydroxymethyl phosphonium chloride (THPC). This is added to an amine-formaldehyde resin precondensate and the fabrics are impregnated in a single-bath process, and dried and baked, followed by an alkaline scour. The formation of insoluble resins within the fibre structure gives the anti-flame effect. As the finish can only be applied under the rigorous control to fabrics in the piece, it is not possible for it to be applied to made-up or existing garments, but once the material has been treated, subsequent washing or dry cleaning of the garment does not affect its flame proofness.

Proban is being marketed by Proban Ltd., 1 Knightsbridge Green, London SW1.

Overseas News

PYRETHRUM BOARD WARNS THAT PRODUCTION MAY BE RESTRICTED

WARNING is given in the annual report of the Pyrethrum Board, that unless sales of Kenya pyrethrum improve materially by the end of this year, restrictions on pyrethrum production may have to be introduced in the Colony next year. Shipments of East African and Belgian Congo flames and extract have dropped from 5,281 tons in 1955-56 to 4,938 tons in 1956-57. Despite this decrease in sales, stocks in Kenya increased in the same period from 780 tons to 1,160 tons. Present trend of sales is stated by the Board to be by no means as promising as the Board would like

Reasons advanced for the low level of sales are the tendency of buyers, due to the improved production position to keep their own running stocks low and end-of-season inventories as low as possible; and the low rate of insect infestations in the Northern Hemisphere in 1956 owing to the unusually cold summer.

Hungarian Process of Obtaining Gallium from Ores

Pure gallium metal at an economic price is claimed to be produced by a process developed by the Hungarian Metal Research Institute. One kilogram of gallium metal can be produced from about 10 cubic metres of the lye used in processing baúxite into alumina. So far only experimental quantities of a few grains of the metal have been extracted. However, the Institute believes that it will be possible to adapt the process for full-scale commercial production.

HP Tank Cars to Carry Liquid Oil Gas

ACF Industries of the US have completed delivery of 300 out of 700 high-pressure rail tank-cars designed to eliminate the need for insulation. Although ordered only two months ago, they are already in service with Phillips Petroleum Co. The tank-cars have been approved for the transport of liquefied petroleum gas or anhydrous ammonia.

NZ Tariff Decision on Emulsifiers

The New Zealand customs department has declared British preferential and general tariffs of 3 per cent in respect of the following approved emulsifiers and wetting agents: CM.586D, CM.590, CM.603, and CM.615.

Dow Order New Chemical Tanker

A new sea-going vessel designed specifically for the bulk shipment of liquid chemicals has been ordered by the Dow Chemical Co., Midland, Michigan, US. The ship will service Dow facilities in the US and carry chemical cargo to major US coastal market areas and overseas ports such as Havana, Tampico, Rotterdam, Hamburg and others. Delivery is scheduled for July 1959.

Like its sister ship the *Marine Dow-Chem*, the new 18,000 ton tank ship will feature protective arrangements to safeguard cargo tanks against contamination of the quality products she will haul. This protection includes double bulkheads which put a minimum of two thicknesses of steel between any two cargo tanks and the sea. It will also have four sets of nickel-lined tanks.

The vessel will be equipped from the time of launching with external magnesium hull anodes and internal wing-tank anodes (of the string type) for protection against corrosion. She will be able to take on a tank cargo of over 17,000 short tons of liquid chemicals.

Large Asbestos Find in Newfoundland

Excellent quality chrysolite asbestos has been found in a mineral concession on Burlington Peninsula on the north coast of Newfoundland by Advocate Mines. So far 27,825,000 tons of asbestos ore have been established, grading $8.15 per ton, with the ore bodies large enough to mine by low-cost open pit methods.

It is planned to produce 3,000 tons per day, at a capital cost of $17,540,000 (approximately £7 million). It is proposed to continue production at this rate for four years, after which production will be increased to 5,000 tons daily.

Burma's First Sulphuric Acid Plant on Stream

Plant for the first Burmese sulphuric acid plant which is now on stream was supplied at a cost of £750,000 to the Burmese firm, Heavy Chemical Industries. The plant is said to have a capacity of 10 tons of standard sulphuric acid a day; the country's present needs are estimated at 7–8 tons a day. Heavy Chemical Industries hope soon to produce hydrochloric and nitric acids for car batteries, and Epsom salts.

Bismuthiols as Colorimetric Reagents for Palladium

Reagents bismuthiol I and II have been found by A. K. Majumdar and M. M. Chakrabartty of the inorganic chemistry department, Jadarpur University, Calcutta, to form coloured complexes in the colorimetric estimation of palladium. These complexes, though soluble in organic solvents as acetone, dioxane methyl cellosolve, pyridine, methyl alcohol and less soluble in ethyl alcohol, are stated not to be extractable.

Maximum absorption regions for the complexes with the reagents I and II have been found to be respectively 400 mμ and 420 mμ at any pH between 2.4 and 10.5 and Beer's law is found to be obeyed with bismuthiol I when the concentration of palladium per ml. is between 0.8 γ and 8.0 γ and with bismuthiol II when the said concentration is between 0.4 γ and 8.0 γ per ml. Sensitivity of the reaction of palladium with bismuthiol I was reduced in acetone, methyl cellosolve and in pyridine and with bismuthiol II in other solvents except methyl cellosolve. Temperatures up to 35 °C. have no influence on the colour system.

Composition of the complexes determined by P. Job's method of continuous variation indicated that in the bismuthiol I complex the ratio of palladium to reagent is 1:1 whereas with the complex by bismuthiol II the ratio is 1:2.

Ions which give coloured precipitates with these reagents in the presence of EDTA, which are coloured or give a coloured product with EDTA and those which form a soluble complex with palladium, interfere with the results.

Krupp to Build Dimethyl-Terephthalate Plant in USSR

At a cost of DM 17 million (£1.4 million approximately), Fried. Krupp, of Essen, Germany, are to build a large plant in the Soviet Union for dimethylterephthalate. The German Imhausen process will be used.

100,000th Oak Ridge Isotope Shipment

Recently the 100,000th isotope shipment was despatched by the Oak Ridge National Laboratory, US. It was of 75 millicuries of potassium 42, destined for medical research use at the University of Iowa. The first delivery of isotopes from the laboratory was in August 1946.

French Chemicals for Portugal

A quota of Fr 5.6 million (about £5,000) is established under the Franco-Portuguese trade agreement for French exports of chemicals. Included in the list are: substitute products for biological ferments, alkaloids and salts thereof, sodium carbonate, sodium chloride, explosives, developers and fixing agents for photography, caustic soda, potassium sulphate, sodium sulphate, etc.

New Belgian Recovery Process for Titanium

Extraction of titanium from ilmenite ores by a continuous automatic process is now being investigated in Belgium. Full details of the recovery process are not yet available. It is understood that titanium is separated from the iron in the ilmenite ore and converted into the tetrachloride. In this form it is passed to the reaction plant with other unspecified ingredients. Heat liberated in the initial processes is used to promote the further reaction. The reaction can be adjusted, it is reported, according to whether the

metal is required as pure titanium sponge or in alloy form.

Cost of titanium by the new process is stated to be under 10s per lb. on the basis of a small-size continuous plant to produce 200 tons a year.

New Jap Zirconium Plant

The Toyo Zirconium Co. have started to build a factory in Saitama prefecture of Japan for the production of 30 tons of zirconium a month. Output will be exported to the US Atomic Energy Commission.

Swiss Borax Exports

Exports of borax from Switzerland will now require licences. Customs tariff No. X1024 gives this announcement by the Swiss Ministry of Economic Affairs.

US Concern at Waste of Helium Gas

A resolution urging the US Government to stop the waste of valuable helium gas was adopted today and sent to the President by the Fifth International Conference on Low Temperature Physics and Chemistry meeting at the University of Wisconsin. The US is the only nation outside the Iron Curtain where any sizable quantities of natural gas containing helium have been found. Only a small fraction of helium-bearing gas flowing to US markets in huge quantities is being stripped of its helium. The rest is 'irrevocably lost.'

F. G. Brickwedde, of Pennsylvania State University, reported at the meeting that there was a real danger that the US supply from this cheap source would be exhausted in a decade or two unless immediate action was taken. Concern at this loss was expressed as liquefied helium is a means for obtaining temperatures down to 455° below Fahrenheit zero.

According to many of the 227 papers presented at the conference, applications of low temperature research is forseen in fields of industry, aviation, and high-speed computing.

UK Representation Sought in South Africa

Stern Brothers, P.O. Box 7641, Johannesburg, seek to obtain the representation of UK producers of chemicals for tanneries. They are particularly interested in an agency for tanning antiseptics used for killing bacteria in tannery tanks.

New Turkish Plant for Valex Valonia Extract

The foundation stone was recently laid in Canakkale, Turkey, for a valex valonia extract plant. A West German firm has been commissioned to install plant and the factory, with an annual output of 3,000 tons, will come into operation next year.

US Boron Mineral Output Up in 1956

US output of boron minerals and compounds (borax, anhydrous sodium tetraborate, kernite, boric acid and colemanite) totalled 944,950 short tons last year (924,496 in 1955 and 890,449 in 1954). Content of B_2O_3 in short tons was 1956 315,047; 1955 293,165; 1954 230,500. Production in 1956 was valued at $39,591,953, compared with $33,816,464 in 1955 and $26,714,440 in 1954.

Swiss Firm Seeks UK Industrial Chemical Agency

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metal is required as pure titanium sponge or in alloy form.

Cost of titanium by the new process is stated to be under 10s per lb. on the basis of a small-size continuous plant to produce 200 tons a year.

New Jap Zirconium Plant

The Toyo Zirconium Co. have started to build a factory in Saitama prefecture of Japan for the production of 30 tons of zirconium a month. Output will be exported to the US Atomic Energy Commission.

Swiss Borax Exports

Exports of borax from Switzerland will now require licences. Customs tariff No. X1024 gives this announcement by the Swiss Ministry of Economic Affairs.

US Concern at Waste of Helium Gas

A resolution urging the US Government to stop the waste of valuable helium gas was adopted today and sent to the President by the Fifth International Conference on Low Temperature Physics and Chemistry meeting at the University of Wisconsin. The US is the only nation outside the Iron Curtain where any sizable quantities of natural gas containing helium have been found. Only a small fraction of helium-bearing gas flowing to US markets in huge quantities is being stripped of its helium. The rest is 'irrevocably lost.'

F. G. Brickwedde, of Pennsylvania State University, reported at the meeting that there was a real danger that the US supply from this cheap source would be exhausted in a decade or two unless immediate action was taken. Concern at this loss was expressed as liquefied helium is a means for obtaining temperatures down to 455° below Fahrenheit zero.

According to many of the 227 papers presented at the conference, applications of low temperature research is forseen in fields of industry, aviation, and high-speed computing.

UK Representation Sought in South Africa

Stern Brothers, P.O. Box 7641, Johannesburg, seek to obtain the representation of UK producers of chemicals for tanneries. They are particularly interested in an agency for tanning antiseptics used for killing bacteria in tannery tanks.

New Turkish Plant for Valex Valonia Extract

The foundation stone was recently laid in Canakkale, Turkey, for a valex valonia extract plant. A West German firm has been commissioned to install plant and the factory, with an annual output of 3,000 tons, will come into operation next year.

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PEOPLE in the news

● MR. D. G. ASHCROFT, an assistant manager of the research department of ICI's Nobel division and head of research engineering since March 1946, has retired. He had been with the company for almost 33 years. A presentation was made to him by DR. DAVID TRAILL, division research director.

● MR. ERIC E. JONES, group commercial director of the Solartron Electronic Group, Ltd., Thames Ditton, Surrey, and vice-president of Solartron Inc., Los Angeles, US, left England on 15 September for a stay of some months in the United States. He will review the progress of Solartron Inc. over the first year of its existence, and further its sales expansion policy, make arrangements for the manufacture under licence in the US of the Solartron electronic reading automaton, implement the policies of the recently formed Solartron-Rheem Inc., and the scientific and technical agreements between the Solartron Electronic Group and the Consolidated Electrodynamic Corporation, Pasadena, Cal.

● MR. W. P. HIRST, chief chemist of the Shell Co. of Africa Ltd., was recently awarded the Gill medal of the Astronomical Society of South Africa for outstanding services to South African astronomy as a computer, observer, writer and lecturer. Despite his amateur status, Mr. Hirst has according to the citation 'become an astronomical computer of high standing. He has computed orbits for several comets, about a dozen asteroids and some double stars.'

● Chairman of Formica Ltd., the new subsidiary of Thomas De La Rue will be MR. A. G. NORMAN (managing director of Thomas De La Rue), managing director will be MR. G. G. RIDDICK. The remaining directors are MR. B. C. WESTALL, and MR. S. C. MOODY, and MR. D. J. O'CONNOR, JR., for the American Cyanamid Co.

● MISS TINA DAVIES, 21-year-old personal assistant to the managing director of the Stabilag Co. Ltd., Hemel Hempstead, Herts, has recently returned from Frankfurt, where she negotiated and completed an agency agreement with Voigt and Haeffmer AG worth £50,000 a year. The agreement marks a first major step taken by the company in the establishment of a large European tie-up in anticipation of the European common market. Products to be supplied to the UK under contract are rod and tube heaters, oven work, etc.

● Following a recent one-day meeting in Nottingham on the knitting and dyeing of Orlon acrylic fibre, DR. FRANK PARKER and MR. ROBERT WELLS, technical experts of the textile fibres department of E.I. du Pont de Nemours and Co., US, have this week held a similar meeting at Frankfurt-am-Main.

● MR. W. MCLELLAND, who since 1945 has been foundry manager at the Blackheath Works of Firth-Vickers Stainless Steels Ltd., has been appointed area sales manager (Scotland and north-east England) by APV-Paramount Ltd., stainless and alloy steel founders, Crawley, Sussex. In addition to his commercial activities, Mr. McLelland will also act in an advisory capacity in technical matters. He will take up his appointment on 1 October, when his home address will be 29 Davison Avenue, Whitley Bay.

● MR. PAUL V. MALLOY has been appointed vice-president—operations of Kemet Company, division of Union Carbide Corporation. Kemet produce highly reactive metals.

● An hon. life membership in the American Society of Metals is to be awarded to DR. WILLIAM HUME-ROTHERY, lecturer in metallurgical chemistry at Oxford and the University of Sheffield. In the words of the society, Dr. Hume-Rothery's 'research, teachings and many distinguished publications have made an outstanding contribution to our knowledge of the nature of the atom, and particularly its behaviour in metals and alloys.'

ICI Report Record Sales of Drikold

DESPITE a generally cold summer, record sales have been recorded by ICI Billingham division for Drikold, solid carbon dioxide made in the ammonia works. A large part of the increase has resulted from heavier demands from ice cream manufacturers, who state that the public now look on their product as an all-the-year-round food and not a seasonal trade, and from brewers and makers of soft drinks.

The record was also partly due to a steady increase in sales to industry, because of the development of a number of new uses, particularly in engineering and in metal foundries. This growth has taken place alongside the development of Billingham's trade in bulk shipments of liquid carbon dioxide.

Computer for Boots

An order for an Emidec electronic data processing system has been placed with EMI Electronics Ltd., Hayes, Middx., by Boots Pure Drug Co. Ltd. for installation at their head office in Nottingham. It will be used for processing orders placed by the 1,300 retail branches and for related accounting and statistical work. In addition to the branches, the company has extensive warehouses and factories with a total stock of 60,000 items.

Permutit Set up New Production Unit for Ion Exchange Resins for Chromatography

A NEW production unit to produce on a quantity basis a wide range of cation and anion exchange resins of varying degrees of crosslinking, and with different particle sizes, for chromatographic and analytical purposes has been set up by the Permutit Co. Ltd., Permutit House, Gunnersbury Avenue, London W4. This development has enabled Permutit to reduce considerably the price of these special resins.

The resins in the present new range are based on Zeo-Karb 225 and De-Acidite FF ion exchange resins. In the case of Zeo-Karb 225, cation exchange resins, the crosslinking is specified in terms of the nominal weight percentage of divinylbenzene in the hydrocarbon polymer. The corresponding weight swelling or water regain, is also tabulated.

In the case of anion exchange resins, the process of manufacture introduces extra crosslinks in addition to those originally placed in the hydrocarbon structure. Consequently with such resins, a figure for the original crosslinking used is misleading in relation to the structure of the final resin, which is better specified by means of the weight swelling or water regain. As a result, in the case of De-Acidite FF only this figure is given in the table. For the same reason it is not possible to produce De-Acidite FF in as wide a range of crosslinking as in the case of Zeo-Karb 225, since materials with very high water regain are difficult to manufacture reproducibly.

In the case of both resins, the smallest particle size cannot be supplied in combination with the lowest degree of crosslinking, since the swelling of the loosely crosslinked materials renders it impossible to produce beads in this size range.

ZEO-KARB 225

DVB per cent	Water regain as grams of water per gram of Na resin	Particle sizes			
1	5–7	14–52	52–100	100–200	
2	3–4	14–52	52–100	100–200	<200
4.5	1.5–2	14–52	52–100	100–200	<200
8	0.9–1.1	14–52*	52–100	100–200	<200
20	0.4–0.6	14–52	52–100	100–200	<200

*Standard Zeo-Karb 225

DE-ACIDITE FF

Water regain as grams of water per gram of Cl resin	Particle sizes			
1.6–2.0	14–52	52–100	100–200	
1.1–1.5	14–52*	52–100	100–200	<200
0.6–0.9	14–52†	52–100	100–200	<200

*Standard De-Acidite FF type 510
†Standard De-Acidite FF type 530

FOR YOUR DIARY

23 SEPTEMBER

Society of Instrument Technology—Swansea, University College. Conference on 'Automatic measurement of quality in process plant'. Until 26 September.

24 SEPTEMBER

Society of Chemical Industry—London, William Beveridge Hall, London University, W1. Symposium, 'Industrial carbon and graphite'. Until 26 September.

26 SEPTEMBER

Oil and Colour Chemists Association—London, Manson House, 26 Portland Place, W1. 7 p.m. Paper, 'Principals of work simplification in industry', by W. Rodgers.

Council of the British Manufacturers of Petroleum Equipment—Annual dinner. Dorchester Hotel, London W1. 7.15 p.m.

27 SEPTEMBER

SAC and RIC—Exeter, The University. Joint meeting on 'Some applications of microchemistry'. Papers, 'Applications to paint and pigments' by C. Walley, 'Applications to soils and fertilisers' by B. M. Dougall. Also on 28 September.

Dyers of Man-Made Fabrics Federation—London, Hamilton House, 138 Piccadilly, W1. Know-How and Know-Why Exhibition of Man-Made Fabrics. Until 4 October.

Change of Name

PHOTO-CHEMICAL CO. LTD., Film House, 142 Wardour Street, London W1, have changed their name to Pathe Laboratories Ltd.

TRADE NOTES

J. H. Carruthers and Co. Ltd., manufacturers of steam and electric pumps, feed water filters, condensing plants, are to build a new factory at East Kilbride. Eventually employees at their present plants at Polmadie, Parkhead and Lambhill will be transferred to East Kilbride.

Change of Address

Rhoden Partners Ltd., design and development engineers in mechanical engineering, have moved to larger premises at 29 Park Crescent, London W1. (Tel: Langham 7488). A new folder describing the company's services is available.

Scottish Agents

Southern Instruments Computer Division, Frimley Road, Camberley, Surrey, have appointed Elesco Electronics Ltd. (associated with Land, Speight and Co. Ltd.), 2 Fitzroy Place, Glasgow C3, as their exclusive agents for the whole of Scotland. All computer division products will be handled by Elesco Electronics including the cathode ray polarograph and data reduction equipment.

Cleveland Meters

Under a reorganisation, Cleveland Meters Ltd., Redcar, have become part of the international group of companies controlled by Neptune Meter Co. of New York, USA. Mr. Dante E. Broggi, president and chief executive officer of Neptune is chairman of the British company whilst the new managing director is Mr. A. Hargreaves, formerly technical director of Cleveland Meters. He succeeds Mr. Gerald W. Fleming who becomes vice-chairman. The board of directors also includes Mr. Edward Meeson, as technical director, and who has been associated with the company from its inception.

Barrier Preparation

Lloyd-Hamol Ltd., manufacturers of the silicone barrier preparation Syl, have introduced a new 7 lb. tin for large-scale users of the product. Trade price is 50s (purchase tax 15s).

Another Canadian Order for QVF

A further order for glass pipeline and fittings for the Polymer Corporation of Sarnia from the Meade Laboratories at Richmond Hill, Ontario, is announced by QVF, Fenton, Stoke-on-Trent. This is the second such order from the Meade Laboratories this year. An earlier order, valued at £10,000 was the largest consignment of glass pipeline ever shipped from this country.

Catalin Antioxidant

Omni (London) Ltd., 35 Dover Street, London W1, announce that they have been appointed the sole representative in the UK for Catalin antioxidant AC-1, manufactured by the Catalin Corporation, US. Details of this antioxidant (2, 6-ditertiary-butyl-para-cresol) together with samples can be had on request.

Commercial News

Lawes Chemical Report Lower Profits, but Maintain Dividend

Group trading profits of Lawes Chemical Co. in the year to June 1957, have fallen from £192,222 to £181,787. After depreciation of £29,987 (£30,722) the balance is £140,520. Taxation absorbs £74,633 (£78,095) leaving a net profit of £65,887 (£72,166). Stocks have increased from £181,703 to £311,380 and capital commitments amount to £25,000.

Dividend on the ordinary is 12½ per cent (same).

Cause of decline in profits is not stated in the report, but it is believed to be due to pressure of costs on margins. No forecast is made on the likely outcome of the current year. As the company is engaged in the manufacture of chemical manures, which is a highly competitive business, the pressure on margins may continue.

Aspro-Nicholas

Aspro-Nicholas announce an estimated group trading profit and investment income of £67,000 (£84,000) for the quarter ended 30 June. First quarterly dividend is unchanged at 6 per cent. Profits from UK operations showed a satisfactory increase, but the reverse occurred in certain subsidiaries.

F. W. Berk and Co.

Chemical manufacturers and merchants, F. W. Berk and Co., are maintaining the interim dividend on their £1,280,000 ordinary shares at 1¼d per 5s share for 1957. The 1956 total was 4½d per share.

It is reported that sales for the first half of the year were a record, being 10 per cent higher than in 1956. Earnings have improved, but rising costs are prejudicing future results. For the whole of 1956, sales increased by 15 per cent. Group net profits, after tax, fell from £174,567 to £115,147.

Brotherton and Co.

Interim dividend of 5 per cent (same) is declared by Brotherton and Co. Ltd., Leeds, on the £1,025,000 ordinary. Last year a final of 7½ per cent was paid, making 12½ per cent (17½ per cent).

British Petroleum

Although half-year sales to 30 June were up £36.4 million to £350.3 million, British Petroleum Co. report a drop in net income of £11.3 million to £22.4 million. This is attributed to the effect of the closure of the Suez Canal and the damage in Syria to the Iraq Petroleum Co.'s pipeline system. Interim dividend of 5 per cent is repeated on ordinary.

Formica Ltd.

Trading by Formica Ltd, the new Subsidiary of Thomas De La Rue Co., began on Monday. The new company has taken over the manufacture and sale of all products including extrusions, formerly handled by the parent company.

Under an agreement between American Cyanamid and Thomas De La Rue, there will be an interchange of technical information in the field of laminated plastics over the next 25 years. American Cyanamid are to be granted 200,000 shares in the new company and have the right to acquire further shares, bringing their total interest up to 40 per cent. Management of Formica Co. is vested in Thomas De La Rue.

Distillers Co.

The Distillers Co. have declared a preference dividend for the six months ending 30 September of 3 per cent.

Reichhold Chemicals Ltd.

An interim dividend of 7½ per cent (same) payable on 1 October is announced by Reichhold Chemicals Ltd. The total dividend for last year was 20 per cent, this included a bonus of 2½ per cent.

Sangers Ltd.

Manufacturing chemists and wholesalers, Sangers Ltd., record a group net profit for the year ended 28 February 1957, of £193,040 (£216,098). Commitments are £30,000. A dividend of 30 per cent (27½ per cent) has been declared.

NEW COMPANIES

ABBEY (PRECISION) HEAT TREATMENTS LTD. Cap. £2,000. Manufacturers of and dealers in metal hardening compounds, etc. Secretary: L. Smith, 5 Brook Way, London SE3.

HEATON PHARMACEUTICALS LTD. Cap. £1,000. Manufacturers of and dealers in chemicals, gases, drugs, etc. Directors: J. E. Heaton and J. E. Best (directors of Heaton and Josephy Ltd., etc.). Reg. office: 35 Cookridge Street, Leeds.

PHOTOPRINTING PRODUCTS LTD. Cap. £100. Manufacturers, retailers, agents and brokers for chemicals and chemical compounds and articles, apparatus and supplies for use in the photographic and printing industries, etc. Directors: N. Page-Roberts, and A. E. V. Wells. Reg. office: 59 New Cavendish Street, London W1.

OVERSEAS COMPANY

BRITISH AEROSOL CORPORATION LTD. Cap. £100,000. Registered in the Bahamas to carry on the business of preparers of aerosol packages, etc. Directors: L. W. Hammerson, B. A. Kirk, G. W. Higgs, P. W. Andreae and E. R. Fingland. British address: Quadrex House, Park Lane, London W1, where Hammerson Group Management Ltd. are authorised to accept service of process and notices.

LONDON GAZETTE

Voluntary Winding-up

(A resolution for the voluntary winding-up of a company does not necessarily imply liabilities. Frequently it is for purposes of international reconstruction and notice is purely formal).

EMFORD SYNDICATE Ltd., chemical merchants, regd. office, 1-2 Great Winchester Street, London EC2. By special resolution, 9 September. Mr. D. Bruce, 1-2 Great Winchester Street, EC2, appointed liquidator.

Market Reports

A WIDE BUYING INTEREST

LONDON Steady conditions have been maintained on the industrial chemicals market with the consuming industries continuing to take good quantities against contracts. The volume of new business is fairly satisfactory for the period and the flow of enquiry for shipment shows no sign of diminishing with buying interest covering a wide range of chemicals. Prices generally are on a firm basis.

There has been no change in the position of the routine potash and soda products and a steady call has been reported for hydrogen peroxide, formaldehyde, borax and boric acid. Demand for fertilisers has been moderate.

There is no change in the coal-tar products market, with pitch attracting more attention on home account and some enquiry for shipment. The light distillates continue in good call.

MANCHESTER Trading conditions in most sections of the Manchester chemical market during the past week have been fairly active and values generally are on a firm basis. In the case of sulphate of copper, however, further easiness has developed. There has been a steady demand for a wide range of textile chemicals and most other industrial chemicals have also been moving into consumption on a satisfactory scale. A fair number of replacement contracts have been reported. Fresh business in fertilisers has been reasonably good in several sections. There is a steady home-trade call for most of the light and heavy tar products.

GLASGOW During most of the past week the Scottish heavy chemical market was fairly active, and a good week's trading can be reported. Demands were for a varied range of chemicals with emphasis on current requirements. These covered a cross-section of industry, including textile and heavy.

Prices generally have been firm, although some advances are still being advised. Against a rather quiet situation in regard to fertilisers, the export market remains fairly active.

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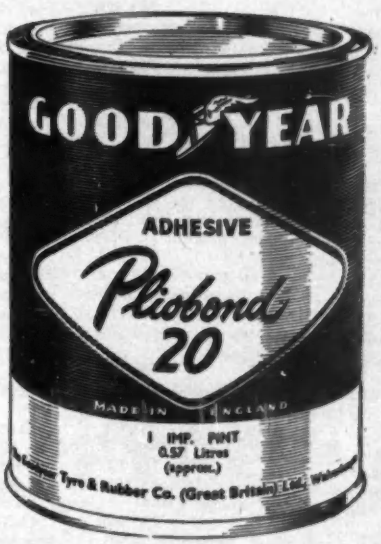

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Specifications filed in connection with the acceptances in the following list will be open to public inspection on the dates shown. Opposition to the grant of a patent on any of the applications listed may be lodged by filing patents form 12 at any time within the prescribed period

ACCEPTANCES

Open to Public Inspection on 23 October

Purification of telephthalic acid. Imperial Chemical Industries, Ltd. [Cognate application 12907.] **785 045 785 052**

Therapeutic preparations containing tetracycline. Bristol Laboratories Inc. **785 225**

Polymerisation of olefines. Imperial Chemical Industries, Ltd. [Cognate applications 10883, 20512, 23204, 23207 25239.] **785 314**

Acetone soluble copolymers. Distillers Co., Ltd. **785 046**

Anhydrotetracycline compounds. Pfizer & Co., Inc., C. **785 047**

Rubber antioxidant mixtures and their application. Imperial Chemical Industries, Ltd. **785 316 785 317**

Aryloxyaliphatic compounds. May & Baker, Ltd. **785 049**

Sonic gas analysers. Parsons & Co., Ltd. C. A. **785 000**

Decorating textile materials. Farbenfabriken Bayer AG. [Addition to 729 122.] **784 946**

Borated dextrine. National Starch Products, Inc. **785 318**

Burner and processes for producing carbon black. Phillips Petroleum Co. **784 947**

Alkylene oxide polymers. Petrochemicals, Ltd. **785 229 785 053**

Photopolymerisation process. Distillers Co., Ltd., and Norrish, R. G. W. **785 055**

Manufacture of chromium free steel. Westfalenhutte AG. **785 325**

N-acylated hyroxy prolines and their use in obtaining D-hydroxyproline and L-hydroxyproline. UCLAF. **785 012**

Acylated D L-proline salts and their use in obtaining D- and L-prolines separately. UCLAF. **785 013**

Method of and apparatus for producing coatings of hard carbides. Metallges. AG. **785 236**

Methods of distilling commercial glycerol liquors. Savonnerie et Manufacture de Produits Chimiques de Port-a-L'Anglais Etablissements Breton & Steinbach. **785 127**

Impregation of sheet materials with synthetic resin latices. Celastic Corp. **785 058**

Process for obtaining bleached semi-chemical pulp. Zellstafffabrik Waldhof. **785 060**

Method and apparatus for preheating feed water in steam power plant. Siemens-Schuckertwerke AG. **785 062**

Inhibiting the attack of ozone on natural or synthetic rubber. Pennsylvania Salt Manufacturing Co. **785 329**

Ion-exchange processes. Permutit Co., Ltd. **785 003**

Condensers made of paper impregnated with poly-chloronaphthalenes. Progil. **785 331**

Process for the resolution of DL-serine. Uclaf. **785 014**

Heterocyclic compounds. Allen & Hanburys, Ltd. **785 069**

Adherent self-curing polysulphide polymer compositions. Minnesota Mining & Manufacturing Co. **785 070**

Defoliants. Ethyl Corporation. **785 332**

Open to Public Inspection on 30 October

Preparation of fluorocarbons. Cady, G. H. **785 641**

Extraction of uranium from its ores. Arden, T. V., Burstall, F. H., and Linstead, R. P. **785 602**

Substituted propionaldehydes. Merck & Co., Inc. **785 351**

Wax compositions. Ruhrchemie AG. **785 444**

Means for delivering controlled quantities of liquids. Koppers Ges., H. **785 446**

Manufacture of organic hydroperoxides. Distillers Co., Ltd. [Addition to 727 498.] **785 607**

Production of pure silicon. Kolflaath, J. A. **785 609**

Subtiltryptasin and its production. Byk-Gulden Lomberg Chemische Fabrik Ges. **785 449**

Chemical reactions. Esso Research & Engineering Co. **785 611**

Cracking hydrocarbons. Badische Anilin- & Soda-Fabrik AG. **785 453**

Diazoamino-compounds and process for making them. Ciba Ltd. **785 613**

Saponaceous detergents. Geigy Co., Ltd. **785 644**

Phosphated metallisable azo dyestuffs. Imperial Chemical Industries, Ltd., Todd, A. R., Booth, G., and Davies, R. R. **785 457**

Fertilisers. Fisons, Ltd. **785 645**

Preparation of pteridine derivatives. Merck & Co., Inc. **785 352**

Production of olefinic gases from hydrocarbon oils. Imperial Chemical Industries, Ltd. **785 547**

Preparation of heterocyclic compounds. Organon Laboratories, Ltd. **785 373**

Fluid polyvalent metal phenates. Lubrizol Corporation. **785 468**

Method and apparatus for generating magnesium vapour in the interior of a molten metal or alloy using magnesium oxide. Hurum, F. J. O. **785 551**

Production of polyalkyene oxide-polybasic carboxylic acid condensation products. Boehme Fettchemie Ges. **785 474**

Cleaning of metal parts. Starax Etablissement De Commerce Et De Credit. **785 475**

Casein. Grinoid, Ltd. **785 476**

Mass analysing instruments. General Electric Co. [Addition to 780 951.] **785 379**

Production of organic nitrogenous fertilisers from animal products and fertilisers produced by such process. Calderoni & Vita. **785 652**

Regeneration of ammonia-sulphur dioxide cooking acid used in production of wood pulp. Sterling Drug, Inc. **785 561**

Detergent compositions. Colgate-Palmolive Co. **785 655**

Complete gasification of liquid and of powdered or pulverulent solid fuels. Giordano, I. **785 490**

Rubber reaction product and preparation and uses thereof. Esso Research & Engineering Co. **785 656**

Process and apparatus for demetallising a metal carbonyl-containing gas. Gulf Research & Development Co. **785 383**

Vulcanisable-vinyl containing organopolysiloxanes. General Electric Co. **785 384**

Pressure regulator for gaseous and liquid media. Teves Maschinen- Und Arma-Turenfabrik Komm.-Ges., A. [Addition to 779 909.] **785 567**

Guanamines. Rohm & Haas Co. **785 386**

Therapeutic fat products and the manufacture thereof. Upjohn Co. **785 387**

Pigment compositions. Armour & Co. **785 388**

Skeletal muscle relaxant comprising 5-chlorobenzoxazoles. McNeil Laboratories, Inc. **785 628**

Apparatus for measuring and feeding charges of pulverulent granular or liquid materials. Des Francs, H.R.M.C. **785 495**

Aralkyl carbinols. Union Carbide Corp. **785 389**

Cellulose acetate having improved colour fastness and process of producing same. Phillips Petroleum Co. **785 497**

Catalyst for gas phase oxidation reactions and process effected therewith. Du Pont De Nemours & Co., E. I. **785 657**

Pigmented styrene polymers. Union Carbide Corp. **785 393**

Functional fluids. Monsanto Chemical Co. **785 570**

Production of phthalocyanine dyestuffs. Farbenfabriken Bayer AG. **785 629**

Purifying benzene. United States Steel Corp. **785 659**

Fractionating solution containing more than one solute. Food Machinery & Chemical Corp. **785 660**

Process for the production of shaped articles from elastomeric polymers containing reactive groups. Farbenfabriken Bayer AG. **785 631**

Method and apparatus for continuously applying a protective coating to metal coated strip. Wheeling Steel Corporation. **785 572**

Irradiated polyethylene and products therefrom. General Electric Co. **785 505**

Radiochemical preparation of copolymers of maleic anhydride and olefinic materials. Esso Research & Engineering Co. **785 507**

Grease composition. Socony Mobil Oil Co., Inc. **785 509**

Emulsion paint vehicles. Grace & Co., W. R. **785 406**

Pharmaceutical compositions containing tetracycline antibiotics. Pfizer & Co., Inc., C. **785 574**

Catalytic conversion of gasoline hydrocarbons. Universal Oil Products, Co. **785 576**

Substituted tetrahydronaphthalenes. Givaudan & Cie Soc. Anon., L. **785 410**

Organosilicon resins. Midland Silicones, Ltd. **785 667**

Separation of acetylene from gas mixtures. Badische Anilin- & Soda-Fabrik AG. **785 668**

Consumable electrode arc melting apparatus. Titanium Metals Corp. of America. **785 638**

Production of polyglycidyl ethers of polyhydric phenols. Naamlooze Vennootschap De Bataafsche Petroleum Matts-Chappij. **785 415**

Nickel-silicon-boron alloys. Coast Metals, Ltd. **785 416**

Chemical compounds for use as X-ray diagnostic agents and preparation. Schering Corp. **785 670**

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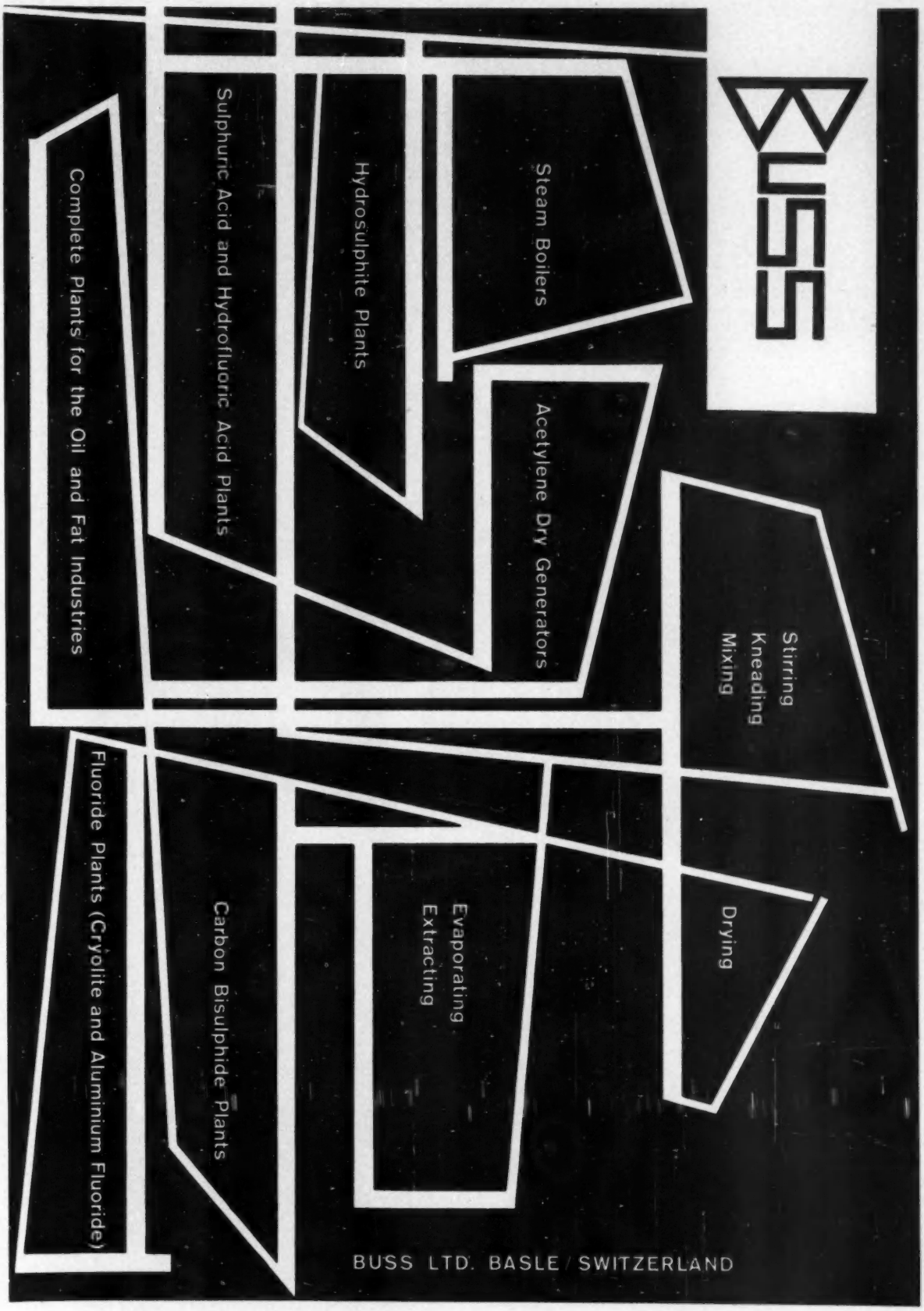
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